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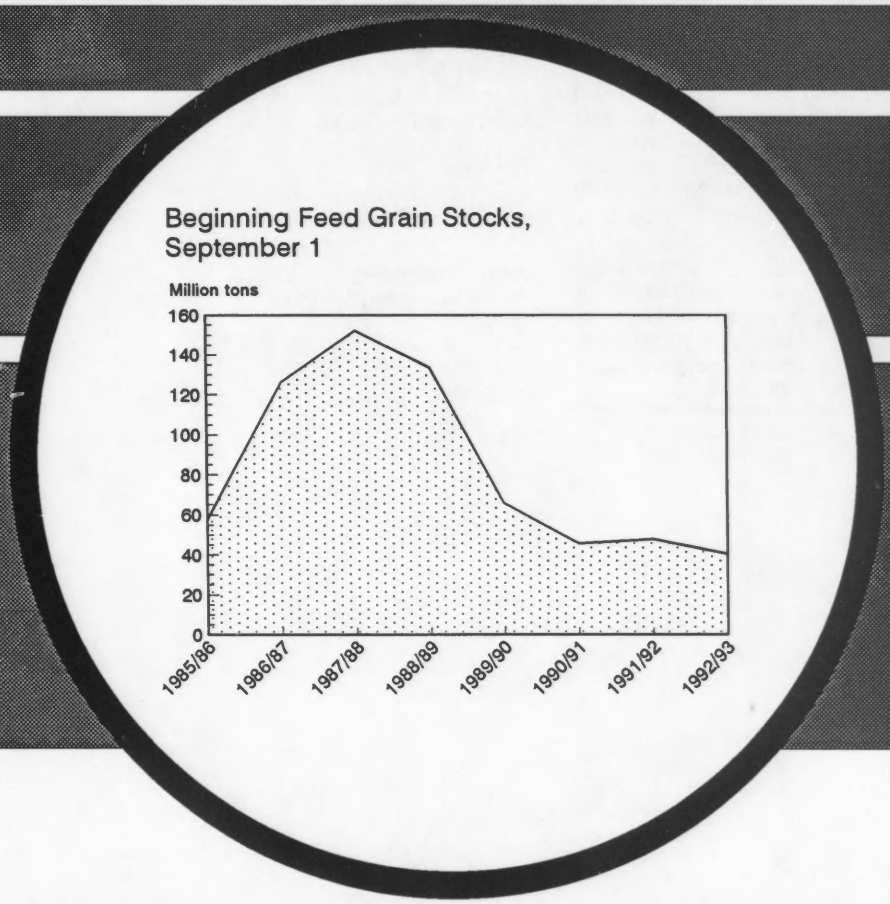
# Feed

## Situation and Outlook Report



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# Summary

*Feed Grain Supplies Down Significantly in 1992*

Feed grain supplies for 1991/92 are forecast at 268 million tons, down almost 10 million from a year ago and the lowest since 1983/84. A nearly 12-million-ton drop in production more than offset a 2-million-ton increase in carryin stocks. Feed grain use is forecast to contract marginally to 227 million tons as lower exports are largely offset by higher domestic disappearance. Feed and residual use is expected to rise with growth in the hog and poultry sectors. Lower returns to cattle feeders and declining dairy cow numbers will be partially offsetting.

The corn supply is down for 1991/92, with production forecast at almost 7.5 billion bushels, 6 percent below last year. Stronger feed and residual disappearance is projected, reflecting larger meat production, reduced supplies of other feed grains, and smaller wheat feeding. Increased food, seed, and industrial use will also contribute to higher domestic use. Corn exports, however, at 1,575 million bushels, are projected to be the lowest since 1986/87. Total corn disappearance will nonetheless exceed production, with ending stocks forecast to fall under 1.3 billion bushels. The corn stocks-use ratio of 16.6 percent will support farm prices between $2.15 and $2.55 per bushel.

Among the other feed grains, sorghum and barley production rose 1 and 10 percent from last year, as larger harvested area more than offset yield declines. However, oats production fell 32 percent due to a 16-percent yield reduction and a 19-percent drop in harvested acres.

Transportation equipment is expected to remain in adequate supply in 1991/92. Demand for barges is likely to remain flat as higher soybean shipments offset an expected drop in corn shipments. Exports through Pacific Coast and Texas ports increased significantly during September-October and should continue to support higher rail shipments.

Global coarse grain production is forecast to drop 4 percent in 1991/92 to 802 million tons, due largely to smaller USSR and U.S. crops. But with larger carryin stocks than a year earlier, world supplies are forecast to fall only 2 percent. Global consumption is forecast to decline nearly 2 percent to 809 million tons, the lowest in 3 years, because of a projected sharp drop in USSR consumption. World trade in coarse grains is projected at 83.2 million tons, down from 84.8 million in 1990/91. Small declines are projected for corn and sorghum, while barley trade is projected up slightly. U.S. coarse grain exports are forecast at 46.9 million tons, down 9 percent. This would reduce the U.S. trade share to 56 percent, the lowest since 1985/86.

FEED GRAIN SUMMARY

| Year 1/ | 1987/88 | 1988/89 | 1989/90 | 1990/91 | 1991/92 | Record prod. 2/ 1985/86 | Lowest stocks 2/ 1975/76 |
|---|---|---|---|---|---|---|---|
| TOTAL FEED GRAINS | | | | | | | |
| | Million acres | | | | | Mil. acres | |
| Planted | 106.5 | 101.8 | 106.1 | 103.4 | 104.6 | 128.0 | 122.6 |
| Harvested | 87.0 | 80.6 | 91.0 | 89.5 | 91.7 | 111.7 | 104.7 |
| Yield (ton/ac) | 2.5 | 1.9 | 2.4 | 2.6 | 2.4 | 2.5 | 1.8 |
| | Million metric tons | | | | | Mil. metric tons | |
| Begin. stocks | 152.1 | 133.6 | 65.9 | 45.5 | 47.7 | 57.5 | 21.1 |
| Prod. | 216.5 | 149.3 | 221.0 | 230.4 | 218.5 | 274.3 | 185.1 |
| Supply | 369.6 | 284.2 | 288.2 | 277.4 | 267.6 | 332.5 | 206.5 |
| Domestic disp. | 183.7 | 157.1 | 173.0 | 178.2 | 180.4 | 206.2 | 133.7 |
| FSI | 36.9 | 37.7 | 38.7 | 39.8 | 40.3 | 35.0 | 17.9 |
| Feed/res. | 146.9 | 119.6 | 134.3 | 138.4 | 140.1 | 135.1 | 115.8 |
| Exports | 52.3 | 61.1 | 69.7 | 51.5 | 46.9 | 36.1 | 48.9 |
| Ending stocks | 133.6 | 65.9 | 45.5 | 47.7 | 40.3 | 126.4 | 23.9 |

| SECTOR | Corn | | Sorghum | | Barley | | Oats | |
|---|---|---|---|---|---|---|---|---|
| Year 1/ | 90/91 | 91/92 | 90/91 | 91/92 | 90/91 | 91/92 | 90/91 | 91/92 |
| | Million acres | | | | | | | |
| Planted | 74.2 | 75.9 | 10.5 | 11.0 | 8.2 | 8.9 | 10.4 | 8.7 |
| Harvested | 67.0 | 68.7 | 9.1 | 9.7 | 7.5 | 8.4 | 5.9 | 4.8 |
| Yield (bu/ac) | 118.5 | 108.9 | 62.9 | 59.4 | 56.1 | 55.2 | 60.1 | 50.6 |
| | Million bushels | | | | | | | |
| Begin. stocks | 1,344.5 | 1,520.9 | 219.8 | 143.2 | 160.8 | 135.4 | 156.9 | 171.2 |
| Prod. | 7,933.1 | 7,485.9 | 571.5 | 578.3 | 422.2 | 464.5 | 357.5 | 242.5 |
| Supply | 9,281.4 | 9,008.8 | 791.3 | 721.6 | 597.9 | 619.9 | 585.4 | 478.8 |
| Domestic disp. | 6,033.9 | 6,150.0 | 415.3 | 404.6 | 382.6 | 389.9 | 413.6 | 370.0 |
| FSI | 1,325.0 | 1,350.0 | 14.0 | 15.0 | 184.3 | 175.0 | 119.5 | 125.0 |
| Feed/res. | 4,708.9 | 4,800.0 | 401.3 | 389.6 | 198.3 | 214.9 | 294.1 | 245.0 |
| Exports | 1,726.6 | 1,575.0 | 232.8 | 200.0 | 79.9 | 85.0 | 0.6 | 1.0 |
| Ending stocks | 1,520.9 | 1,283.8 | 143.2 | 117.0 | 135.4 | 145.0 | 171.2 | 108.0 |
| Stocks-use ratio | 19.6 | 16.6 | 22.1 | 19.4 | 29.3 | 30.5 | 41.3 | 29.1 |
| Avg. farm price | 2.28 | 2.15-2.55 | 2.12 | 2.05-2.45 | 2.14 | 2.00-2.20 | 1.14 | 1.10-1.20 |

1/ Corn and sorghum, September/August; barley and oats, June/May.
2/ Based on corn since 1975/76.

*Feed Grain Supply and Use*

# Feed Grain Supply Smallest Since 1983/84

*Lower feed grain production causes supplies to fall below 270 million tons.*

Beginning feed grain stocks for 1991/92 are estimated at 47.7 million tons, up 2.2 million from a year ago and the first year-over-year increase in 4 years. However, the small increase in stocks is insufficient to offset the smaller crop, which is forecast at 218.5 million tons, more than 5 percent below 1990 production. With imports virtually unchanged, 1991/92 feed grain supplies are forecast to total 267.6 million tons, almost 10 million below last year and the lowest since 1983/84, when supplies dipped to 245.5 million tons.

### *Ratio of Harvested to Planted Area Increases*

The area planted to feed grains this year increased by 1.2 million acres in response to lower set-aside requirements from 10 to 7.5 percent for corn, sorghum, and barley. Dry conditions in the eastern Corn Belt and northeastern States during June and early July significantly reduced potential corn yields, while weather problems also contributed to lower barley, oats, and sorghum yields from a year earlier. As a result, the national average yield of feed grains declined to 2.38 tons per acre, 7 percent below 1990. In spite of lower yields, the harvested area as a percent of plantings increased to 87.7 percent, compared with an average of 86.6 percent for the previous 2 years.

The average corn yield of 108.9 bushels per acre is down 8 percent from last year and largely reflects the effects of the dryness in the eastern Corn Belt. Average yields for sorghum, barley, and oats were also lower than last year by 6, 2, and 16 percent, respectively.

### *Feed Grain Stocks Tighten*

Tighter feed grain supplies for 1991/92 and sluggish world trade are expected to limit total feed grain disappearance to 227 million tons, compared with 230 million last year. This will also represent the lowest feed grain disappearance since the 1988/89 drought year. Although total disappearance will decline, domestic use is forecast to increase slightly to 180 million tons. Feed grain exports are forecast to fall almost 5 million tons from a year earlier.

With 1991 feed grain supplies down 9.8 million tons and total use declining only 2.4 million tons, ending 1991/92 feed grain stocks are forecast to drop more than 7.4 million tons to 40.3 million. Ending 1991/92 stocks will be the lowest since 1983/84 and represent a stocks-to-use ratio of 17.7 percent.

### *Feed Use To Increase Marginally*

Wheat feeding during the June-August quarter this year was again supported by weak wheat prices relative to corn prices. In addition, disease problems in the soft red winter wheat region reduced milling quality, thereby increasing the amount of feed quality wheat available. However, during June-August, feed and residual disappearance of wheat was around 380 million bushels, compared with 405 million last year. More than offsetting the decline in wheat, feed and residual disappearance of feed grains during June-August increased to 23.2 million tons, compared with 22.1 million a year ago.

With average wheat prices increasing substantially relative to corn and other feed grains, feed and residual disappearance of wheat is likely to decline substantially in 1991/92 (September 1 to August 31). Larger meat output for 1991 and 1992 supports increased feed grain demand during 1991/92. However, generally lower livestock prices and higher feed costs will moderate demand somewhat. In addition, record large hay supplies and falling forage prices will allow livestock producers, especially in the cattle and dairy sectors, to substitute relatively cheap hay for more expensive feed grains. Overall, feed and residual use of feed grains during 1991/92 is forecast to increase only marginally to 140 million tons.

# Smaller Corn Crop Reduces Available Supplies

*Lower corn yields reduce 1991 corn production to 7.5 billion bushels, causing 1991/92 supplies to fall to 9.0 billion.*

Low rainfall in the eastern two-thirds of the Corn Belt is largely responsible for this year's reduced output. As of November, corn yields were forecast to decline 36 percent in Pennsylvania, 27 percent in Indiana, 24 percent in Ohio, and 13 percent in Illinois. If corn yields in these four States had matched 1990/91 yields, U.S. corn production would have been 528 million bushels higher.

The November estimate of corn production released by the National Agricultural Statistics Service (NASS) placed output at 7.49 billion bushels, down 6 percent from a year ago and virtually unchanged from last month's forecast. With forecast harvested area up 1.7 million acres from last year to 68.7 million,

average corn yields are projected at 108.9 bushels per acre.

The smaller 1991 production has more than offset a modest increase in beginning stocks to reduce total 1991/92 corn supplies to 9.01 billion bushels. This is the smallest supply since 1984/85 when carryin stocks were a meager 1.01 billion bushels.

While supplies are lower for 1991/92, forecast yields in November are higher than earlier in the season. In September, NASS forecast an indicated average yield of 106.1 bushels per acre and total production of 7.30 billion bushels. Favorable growing and harvesting conditions continued through September and October, boosting yield prospects. The increase in forecast production from September to November is due entirely to improved yields, as the estimate of harvested area remained virtually unchanged. The States showing the greatest yield improvement were Missouri (8 bushels per acre), Michigan (7), and Illinois, Iowa, and Nebraska (5). These five States accounted for nearly all of the 190-million-bushel net increase in forecast production between September and November.

### *Harvest Progress Is Rapid*

The dry conditions experienced this summer and the favorable September and October weather allowed the corn harvest to commence and proceed well ahead of the normal pace. As of November 3, 93 percent of the crop had been harvested, compared with the previous 5-year average of 81 percent. Of the 17 major producing States, all were at or ahead of their 5-year averages with only Texas and North Carolina reporting slower harvest progress than last year.

The November *Crop Production* report indicated harvested corn area at 68.7 million acres, which represents 90.6 percent of the area planted. This compares favorably with harvest to planting ratios of 89.6 and 90.3 percent in 1989 and 1990, respectively.

### *Further Declines In Exports To Limit Disappearance*

Total disappearance of corn in 1991/92 is forecast to decline modestly as higher domestic use is more than offset by reduced exports. Through the first 2 months of the 1991/92 marketing year, corn exports are up sharply due to large shipments to the USSR. USSR imports have been aided by early season credit guarantees. The first allocation of U.S. credit guarantees to the USSR did not come until well into the season in 1990/91.

Sales to the rest of the world in aggregate have thus far lagged a year earlier. Reduced global imports of corn and larger foreign exportable supplies are expected to cause a reduction in U.S. exports. Thus, 1991/92 corn exports are forecast to decline to 1,575 million bushels.

Domestic disappearance of corn during 1991/92 will be supported by continued growth in both the livestock and food and industrial use sectors. Larger livestock inventories, particularly hogs, reduced supplies of other feed grains, and smaller wheat feeding is forecast to boost the feed and residual component of corn to 4,800 million bushels, nearly 2 percent above last year.

Food, seed and industrial use of corn is forecast to reach 1,350 million bushels in 1991/92, up less than 2 percent. The modest growth in domestic use will combine with the 9-percent reduction in exports to limit total disappearance to 7,725 million bushels, 1 percent below last year.

### *June-August Use Lowest Since 1987/88*

Corn supplies during June-August 1991 were up 5 percent from a year earlier. However, very sluggish exports (down 17 percent) and marginally lower food and industrial use (down 1 percent) offset higher feed and residual disappearance (9 percent), as total June-August disappearance of 1,473 million bushels was off 2 percent from the same quarter a year ago. June-August was the fourth consecutive quarter of year-over-year declines in corn use. As a result, corn stocks began to recover from a year earlier by the middle of the marketing period. The reported September 1 corn stocks totaled 1,521 million bushels, 176 million higher than last year, but more than 400 million below September 1, 1989 stocks.

The composition of corn stocks has changed considerably from a year ago. Corn inventories held by the CCC increased substantially to 371.1 million bushels as farmers forfeited most of their reserve stocks (FOR). The FOR stocks had been placed in reserve at loan rates above current market prices. Thus, it benefited producers to forfeit the stocks to the CCC or pay off the reserve loan with certificates, rather than retain ownership of the grain by paying off the loan plus accrued interest. Only 2.6 million bushels of corn remained in the FOR as of September 1,

Table 1--Corn supply, disappearance, and stocks, Jun.-Aug.

| Item | 1989/90 | 1990/91 |
|---|---|---|
| | Million bushels | |
| Supply: | | |
| Beginning stocks, June 1: | 2,843.2 | 2,992.0 |
| CCC | 299.3 | 435.9 |
| FOR | 392.5 | 29.0 |
| Loan | 444.1 | 638.9 |
| Uncommitted | 1,707.3 | 1,888.2 |
| Imports (Jun.-Aug.) | 0.2 | 1.5 |
| Total supply | 2,843.4 | 2,993.4 |
| Disappearance: | | |
| Food, seed, & industrial | 340.0 | 349.6 |
| Exports | 502.6 | 419.4 |
| Feed and residual | 656.3 | 703.5 |
| Total use | 1,498.9 | 1,472.6 |
| Ending stocks Sept. 1: | | |
| CCC | 233.0 | 371.1 |
| FOR | 386.7 | 2.6 |
| Loan | 112.2 | 211.1 |
| Uncommitted | 612.6 | 936.1 |
| Total | 1,344.5 | 1,520.9 |

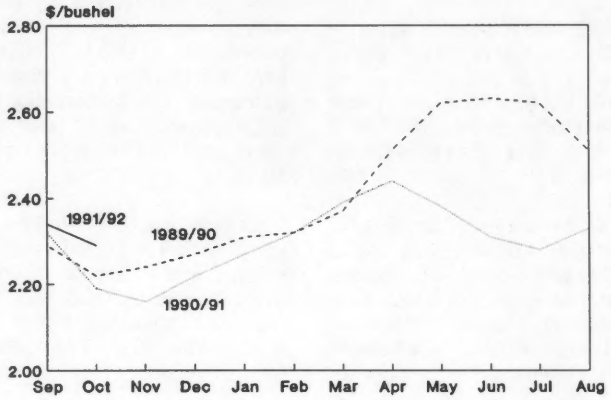
Totals may not add because of rounding.

compared with 387 million a year earlier.

### *Corn Prices Weaker In June-August*

The average price received by farmers weakened seasonally during June and July. Higher corn plantings and a weak export pace negatively affected prices as expectations of building stocks were factored into bid prices. Between May and July, average farm prices declined from $2.38 per bushel to $2.28. However, the dry conditions had reduced production expectations by August. Thus, farm prices reversed their downward trend, increasing to $2.34 per bushel in September.

Figure 1
Farm Corn Prices




Farm prices have continued to decline since September as crop prospects improved. October average farm prices were reported at $2.29 per bushel, down 5 cents per bushel from a month earlier but still 10 cents above October 1990. Corn prices in the coming months will largely hinge on sales to the USSR and domestic use.

## Grain Sorghum Production Recovers

*Marked improvement in some major producing States boosts sorghum yields from early estimates.*

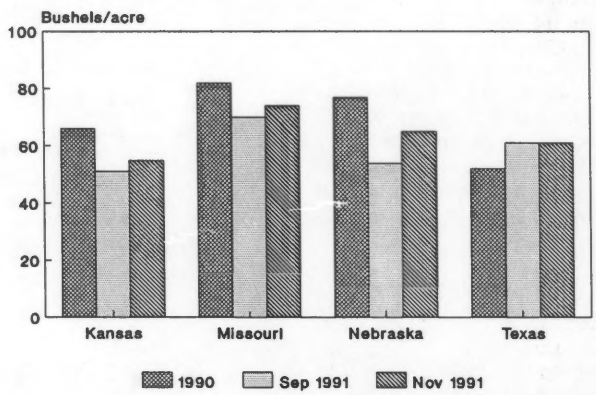
In September, national average sorghum yields were forecast at 56.2 bushels per acre, down from 62.9 in 1990. The November forecast is up 3.2 bushels per acre from September's forecast to 59.4. As a result, sorghum production is forecast to increase marginally from a year earlier to 578 million bushels, compared with the 4-percent reduction forecast in September.

Yield estimates have improved substantially in most major producing States since the September estimates. Kansas, Missouri, and Nebraska forecasts were increased by 4, 4, and 11 bushels per acre, respectively, from September. As a result, forecast production in the three States increased 28.4 million bushels collectively. This represents over 90 percent of the net adjustment in total U.S. output from September to November.

Sorghum supplies for 1991/92 are estimated to reach 722 million bushels, down almost 70 million from last year. This is less than half the peak supplies of 1,490 million bushels experienced in 1986/87. The lower supplies are expected to reduce both domestic use and exports in 1991/92 as total disappearance is forecast to drop to 605 million bushels.

Domestic use of sorghum is forecast to decline more than 10 million bushels in 1991/92 to under 390 million bushels, the lowest since the 1980 drought limited use to just 334 million. Forecast exports of 200 million bushels are the smallest since 1986/87, when feed grain

Figure 2
Sorghum Yields by State

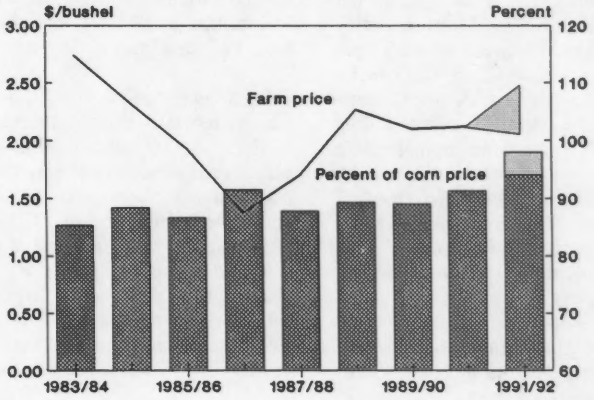


exports were below the current forecast level.

### *High Sorghum Prices Relative to Corn*

The extremely tight supplies for sorghum have increased sorghum prices relative to corn in recent months. Over 1983/84-1988/89, farm prices of sorghum averaged 88 percent of corn prices. Sorghum prices increased to 89 percent of corn prices in 1989/90 and to 93 percent in 1990/91. Continued tight sorghum supplies in 1991/92 are expected to keep sorghum-to-corn prices relatively high. Average farm prices of sorghum are forecast to average $2.05 to $2.45 per bushel, which represents approximately a price ratio relative to corn of 95 to 96 percent.

Figure 3
Sorghum Prices




### *June-August Disappearance Off Sharply*

Sorghum use during the last quarter of the 1990/91 marketing year declined dramatically from a year earlier as supplies were down over a third. June-August exports of 41 million bushels were 37 percent below a year ago, while feed and residual use was down nearly 40 percent. Total quarterly disappearance of 79 million bushels was down 32 percent.

## Larger Harvested Area Boosts 1991 Barley Production

*A nearly 1-million-acre increase in harvested area pushed barley production to 464 million bushels.*

The Nation's 1991/92 barley crop is estimated at 464 million bushels, up 10 percent from the previous year's harvest. In contrast to the 1990/91 crop, yields were down, while the harvested area rose significantly. A 884,000-acre increase in the harvested area brought the total to 8.4 million acres. This figure is well below the average of almost 8.8 million for the 1980's that peaked in 1986/87 at 12.0 million acres. Yields in 1991/92 are estimated at 55.2 bushels per acre, down only 0.9 bushel from the year-earlier crop, but nonetheless the third highest on record.

With generally good crop conditions, barley yields of the major producing States in the Pacific Northwest rose in 1991. Idaho yields increased from 72 to 75 bushels per acre, while Washington and Montana yields increased to 65 and 52 bushels, respectively. For the year, these three States combined to produce 39 percent of the Nation's barley.

The biggest producing State continued to be North Dakota, with 1991/92 production estimated at 138.7 million bushels, up 7 percent from 1990/91. While average yields (49.0 bushels per acre) were down 4 bushels from a year earlier, harvested acres were up 380,000 or 16 percent.

Minnesota's barley crop, on the other hand, was reportedly limited by too much moisture during the growing season. In this State, which produces mostly malting quality barley, yields fell from 63 to 50 bushels per acre, as both the quantity and quality of the crop suffered. Production totaled only 43.8 million bushels, down from 50.4 million in 1990/91.

### *Larger Barley Output Increases Supplies*

Barley stored in all positions on September 1, 1991, amounted to 441.1 million bushels, up almost 31 million from the same time a year earlier. Of the total, barley stored on and off farms rose significantly. On-farm storage increased from 258.4 million bushels in 1990 to 272.5 million in 1991, while off-farm storage increased from 152.5 million bushels to 168.6 million.

A large portion of U.S. barley stocks was stored in North Dakota, with 130 million bushels stored in all positions, 14 million more than a year earlier. Montana had about 72 million bushels, Idaho had almost 50 million bushels, and Washington had 40 million in storage on September 1. All are up from year-earlier totals. As might be expected, Minnesota barley stocks fell about 8.5 million bushels to only 60.9 million.

Average farm prices for the 1991/92 June-May crop year are forecast to average $2.00 to $2.20 per bushel, com-

pared to $2.14 in 1990/91 and $2.42 in 1989/90. All barley prices peaked at $2.81 in 1974 and again at $2.80 per bushel in 1988/89. Malting barley prices in 1990/91 averaged $2.33 per bushel, down from $2.73 per bushel a year earlier. Feed barley prices, however, declined only 10 cents, falling from $2.06 to $1.96 per bushel. As a result, the gap between malting quality and feed quality barley fell from 67 cents to only 37 cents per bushel. Malting barley prices during the late summer and early fall months rose as a result of buying activity by brewers.

Feed and residual disappearance for the 1991/92 crop year is forecast at 215 million bushels, up from 199 million in 1990/91 and 190 million in 1989/90. FSI use is expected to fall slightly to 175 million bushels this year, down from 184 million in 1990/91, and about the same as 2 years ago.

U.S. barley exports in 1991/92 are forecast to rebound slightly from a year earlier. At 85 million bushels, this year's total is about equal to 1989/90, but remains far below the 137-million-bushel peak registered in 1986/87. In what also continues a trend of recent years, U.S. barley exports will once again depend heavily on Export Enhancement Program sales, which in 1990/91 accounted for well over three-quarters of U.S. international sales.

Further mirroring year-to-year changes in the barley supply and demand balance sheet, this year's increased outturn was tempered with lower beginning inventories. However, in contrast to 1990/91, production gains outstripped lower beginning stocks to increase barley supplies by 23 million bushels to 620 million. Total use for the 1991/92 year is forecast to grow only 13 million bushels. Thus, by the end of the 1991/92 crop year (May 31, 1992) barley stocks are expected to grow by 16 million bushels to 145 million. This brings the projected stocks-to-use ratio up 1 percentage points to 30.5 percent for the year, but still significantly below most other years.

## Smaller Harvested Oats Area Again Reduces Supplies

*A sharp reduction in average oats yield combines with reduced area to cut oat production 32 percent.*

Oats production continues to plummet as the number of harvested acres continues to set record lows. In 1991/92, harvested oats acreage is under 4.8 million, down from 5.9 million and 6.9 million in each of the 2 previous years respectively. In addition, the estimated oats yield for 1991/92 is only 50.6 bushels per acre, down from 60.1 in 1990/91. Production for the 1991/92 crop year is forecast at only 243 million bushels, only marginally higher than the drought-ravaged outturn of 1988/89—the lowest on record.

As in 1990/91, South Dakota has once again produced more oats than any other State, this year with 38.5 million bushels. With roughly the same yields, South Dakota produced nearly 30 percent less oats in 1991/92 than in 1990/91 due to a similar drop in harvested area. The decline in oats production shows up among other State data, including the major producing States. Of all the other top producing States, (North Dakota, Wisconsin, Minnesota, and Iowa) only North Dakota registered a gain in area harvested and production, although yields declined 1 bushel per acre. In each of the other States, crop yields were 25 to 39 percent below 1990/91.

### *Oats Supplies and Inventories Continue To Erode*

The National Agricultural Statistics Service (NASS) reported that 281.7 million bushels of oats were held both on farm and off as of September 1, 1991. This is 70 million bushels fewer than a year earlier. Oats inventories are forecast at 108 million bushels when the 1991/92 crop year ends on May 31, 1992, the second lowest on record, and only 10 million bushels above 1988/89. Except for that year, carryout inventories averaged almost 170 million bushels during the 1980's.

Oats prices during 1991/92 are expected to remain far above the loan rate. Farm prices of oats since 1986/87 have averaged about 45 cents per bushel above the national average loan rate. The average excludes 1988/89, when oats prices soared to an average $2.61 per bushel, and farm prices were $1.71 per bushel above the loan rate. As a result, most oats in inventories remained outside the farmer-owned reserve (FOR) and CCC stocks. In 1990/91, all 171 million bushels in ending inventories were free stocks. For 1991/92, ending stocks are forecast at 108 million bushels.

Oats imports into the United States are expected to remain high once again, but contract modestly (reversing an almost continuous trend of annual increases since 1982). During the latter half of the 1980's, oats imports increased from 32 million bushels to over 70 million by 1990/91. For 1991/92 imports are forecast at 65 million bushels, down 6 million from the year before, with most coming from traditional suppliers. As a result, the United States is forecast to continue to be the world's largest net importer of oats. The last time that the United States exported more oats than it imported was in 1981/82. Exports are forecast at only 1 million tons.

### *Smaller Supplies Force Use Lower In 1991/92*

Estimated production declines during the 1991/92 crop year are expected to lead directly to a reduction in domestic use during the year. At 370 million bushels, domestic consumption is forecast down 11 percent from 1990/91.

Feed and residual use of oats is likely to absorb most of the reduction in 1991/92. Feed and residual use is forecast down almost 50 million bushels from the previous year. On the other hand, the link

between food, seed, and industrial (FSI) uses and oats prices is not as close. FSI uses are forecast to grow to 125 million bushels, 5 million more than 1990/91.

Except for drought years, oats prices trended downward during the 1980's, and the trend may continue in 1991/92. Average farm prices are forecast at $1.10 to $1.20 per bushel, compared to $1.14 for 1990/91. These numbers are around 50 cents per bushel below average farm prices in the early 1980's.

# Hay Supplies Reach Record Highs

*Record yields, large carryin, and higher area harvested combine to produce hay supplies of 158 million tons for 1991/92.*

Supplies for the current year have been bolstered by continued large beginning stocks—matching the 1990/91 total of 27.1 million tons. However, a high harvested area and a record hay yield in 1991/92 resulted in record production, almost 3 million tons above the previous record in 1986/87. As a result, the Nation's hay supply for 1991/92 is forecast at 158.4 million tons, up over 11 million from a year earlier.

Hay's harvested acres rose in 1991/92 from 61.6 to 63.1 million acres, reversing a 2-year decline. Major hay producing States that registered relatively large growth in the number of harvested acres this year include South Dakota (the leader once again, gaining 300,000 acres), Texas and Minnesota (each with an increase of 200,000 acres), and Montana (gaining 150,000 acres). Wisconsin, again the largest producer, registered no growth in harvested acres. Nebraska's harvested acres declined the most (300,000) as harvesting from set-aside acres and prairie-hay acres diminished following 1990/91's high.

### Alfalfa Hay Harvested Acres and Production Rise

Alfalfa hay is being harvested on over 25.8 million acres in 1991/92, up 2 percent from the previous year. Harvesting of all other hay types is estimated on 37.3 million acres in 1991/92, up from 36.2 million a year earlier.

Production of alfalfa hay and alfalfa mixtures rose significantly in 1991/92 to 87.3 million tons. This is up over 3.7 million tons, or 4 percent, from last year. Much of the Nation's alfalfa production is consumed in the major dairy States scattered across the country. However, alfalfa outturn improved from 1990/91 in only 3 of the 10 largest dairy States: Minnesota and Wisconsin (each with excellent growing conditions resulting in significant yield gains), and Texas. Typically adverse weather conditions across the Corn Belt and northeastern States were responsible for declining yields and production losses in other major dairy States, including Iowa, Ohio, and Pennsylvania.

All other hay production rose 12 percent to exceed 71 million tons in 1991/92. This hay, in contrast to alfalfa hay, is primarily fed to beef cattle. The Texas "other hay" crop outturn rose from 7.6 million tons to 10.0 million this year, as weather conditions improved to allow crop yields to rise 25 percent to 2.5 tons per acre. Other beef producing States with production gains included Florida, Kentucky, Montana, Oklahoma, and South Dakota. Year-to-year reductions were registered in Kansas and Nebraska.

### Hay Prices To Decline

In 1990/91 the average price received by farmers for hay fell from $85.40 to $83.20 per ton. Even so, the 1990/91 price remained relatively high, following a runup in the years immediately after the 1988 drought. Both alfalfa hay and other hay prices fell as well. For the year, alfalfa hay prices received by farmers averaged $89.20 (down $4.60 per ton) and other hay prices fell only 40 cents to $65.10 per ton.

Through the first half of the 1991/92 hay year (May-April) prices received by farmers for all hay, alfalfa, and other hays are all down sharply from a year earlier. All hay prices averaged $72.47 per ton, down over $15 per ton from a year earlier. Alfalfa hay prices are down over $17.50 per ton, while other hay prices are about $7 per ton lower. This, however, is only a partial indication of year-long prices, as weather conditions in the upcoming winter and spring months could alter dairy and beef-cattle demand for hay, which in turn may drive prices higher or lower.

The number of roughage consuming animal units (RCAUs) in 1991/92 is estimated at 78.8 million. This is an unusually large increase of 3 million from the 1990/91 estimate. Most of the increase is in beef cattle not on feed, whose numbers swelled to over 56.5 million. However, the large gain in hay production for the year was more than enough to offset the RCAU gains, and as a result, the hay supply per RCAU for 1991/92 is forecast to grow from 2.30 tons to 2.35 tons. This is the most since 1987/88, when supplies per RCAU amounted to 2.36 tons. Hay disappearance per RCAU will likely grow from 1.94 tons in 1990/91 to around 2 tons per unit in the current year. If consumption per RCAU in 1991/92 matches that of the previous year, hay consumption will reach almost 153 million tons, leaving well over 32 million tons in carryover stocks for the 1992/93 year.

### Range and Pasture Conditions Improve

Range and pasture conditions through the end of October 1991 indicate a slight improvement over last year. At a rating of 72 percent, conditions are in the middle of the "poor to fair" category, slightly below the 1980-89 average of 73 percent. Conditions deteriorated during October; the index was 77 on October 1, up 7 percentage points from a year earlier.

While California's rating is up from the drought-ravaged 34 percent in 1990 to 55 percent in 1991, it is still rated "very poor." California's average rating over the 1980's, however, was 79 percent. Other States with significant improvement in range and pasture conditions from a year ago are the Delta States (Arkansas, Louisiana, and Mississippi) as well as Minnesota, Montana, and Wyoming. Wyoming had a 99-percent rating. However, ratings for Nebraska (58), Kansas (58), Arizona (55), Virginia (57), West Virginia (50), South Carolina (56), Oregon (56), and Pennsylvania (50) were all well below a year ago.

*Feed Demand*

# Feed Use To Rise

***Low returns are slowing cattle placed on feed and are resulting in declining dairy cow numbers. However, based on favorable returns over the past couple of years, hog and broiler producers are expanding production, thereby boosting demand for feed in 1990/91 and again in 1991/92.***

Feed and residual use of the four feed grains—corn, sorghum, barley, and oats—totaled 138 million metric tons in 1990/91, up from 134 million in 1989/90. Use in 1991/92 is expected to increase 1 percent because of slightly more grain consuming animal units (GCAU's) and less wheat feeding.

The index of GCAU's in 1991/92 is expected to be up nearly 800,000 units from 1990/91's index, because of increases in hog, broiler, and turkey production. In 1990/91, the index was up 3 million units from a year earlier, led by increased numbers of cattle on feed, hogs, broilers, and turkeys.

The index of GCAU's may understate the demand by cattle on feed in 1990/91 and early in 1991/92. Feedlots have been feeding cattle to heavier weights, which usually requires more feed than the conversion factors used in estimating GCAU's. However, with higher corn prices and favorable forage supplies in most areas, cattle may stay on pasture to heavier weights, then go on feed later.

Farm milk prices during most of the past year have been down from a year earlier, contributing to a decline in the number of dairy cows fed in 1991/92. However, dairymen are feeding higher levels of grains and other concentrates. In October 1991, 17.3 pounds of grains and other concentrates were being fed daily, up from 17.1 in 1990. A decline in dairy cow numbers this year is expected to result in a decline in feed demand by the dairy sector.

The latest hogs and pigs survey on September 1, 1991, documented that the expansion in sows farrowing and pig crops was continuing. Farrowing intentions for September 1991-February 1992 show an 8-percent increase. If producers carry through with these intentions, hog slaughter next spring and summer will continue substantially above a year earlier. Thus, feed demand by the hog sector is expected to be up sharply.

Feed use by the poultry sector will increase in 1991/92 as more birds are raised and more hatching eggs are produced. Even with increased supplies of beef and more pork expected, broiler producers continue to increase the number of eggs set and chicks hatched. Current indications are for continued expansion in the number of turkeys raised in 1991/92, but large turkey cold storage stocks this fall are holding down turkey prices and could moderate increases from those of the last few years.

Egg producers appear to have settled into keeping egg production about in line with population growth. Table egg production in 1991/92 is expected to increase slightly. The hatchery supply flocks for the broiler industry will continue expanding to supply eggs for hatching.

Figure 4

Grain and Roughage Consuming Animal Units

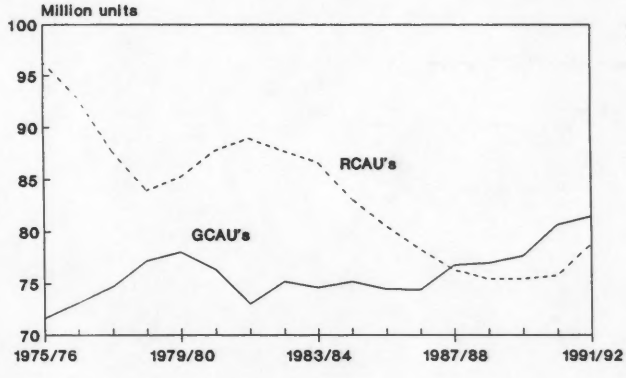
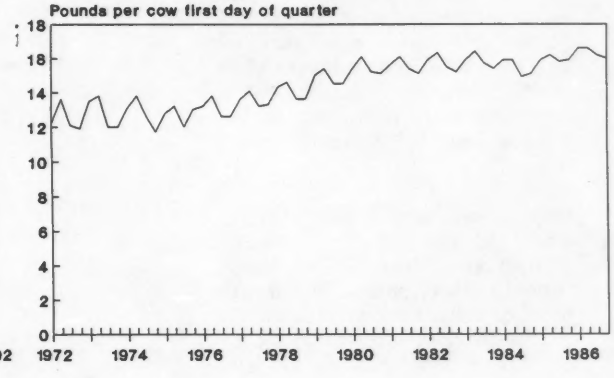



Figure 5

Grain and Other Concentrates Fed to Milk Cows



*Food, Seed, and Industrial Use of Corn*

# FSI Use Claims Steady Share of Corn Use

*Slow growth in the economy during 1991/92 is expected to moderate industrial demand for corn. While complete data for 1990/91 are not yet available, total food, seed, and industrial use of corn appears to have grown 3 percent from the year earlier.*

Corn used for food, seed and industrial products (FSI) has been constantly growing over time. However, as a percentage of total use, the FSI sector has remained about the same. In 1990/91, FSI use accounted for 17 percent of total use, up from 16 percent in 1989/90. For the marketing year, FSI use likely rose 3 percent from a year earlier due to increased shipments of corn sweeteners and starch. For 1991/92, corn FSI use of 1,350 million bushels is again expected to represent 17 percent of total use, but only a 2-percent annual growth rate.

In 1991/92, corn sweeteners' use of corn is expected to increase nearly 3 percent from 1990/91's 595 million bushels. Use in 1990/91 was also up 3 percent. The growth in corn sweeteners in recent years has been greater in glucose and dextrose than in high fructose corn syrup (HFCS). Glucose and dextrose are used in baking and in making light beer, both of which have been strong growth markets. HFCS is mainly used in soft drinks, which are more in demand during hot weather.

Still, glucose and dextrose shipments in 1990/91 were up 4 percent from a year earlier and HFCS shipments were up 3 percent. With slow growth in the economy and a slight increase in corn prices in 1991/92, corn use in glucose and dextrose is expected to be up 3 percent from last year while HFCS increases just 2 percent.

Shipments of starch in 1990/91 represented 180 million bushels of corn, up nearly 5 percent from 1989/90. Starch is used in paper production and wall board, as well as for food. A slowing in the construction business may reduce demand for corn starch and the slow growth in business generally could slow paper use. As a result, corn used for starch production is expected to increase less than 3 percent in 1991/92.

Alcohol production in 1991/92 is expected to about equal production in 1990/91. All alcohol production in 1990/91 was up about 2 percent from the year earlier with most of the increase in alcohol used for fuel. Blenders increased the use of alcohol when gasoline prices rose during the war in the Middle East, especially in December 1990 and January 1991. By May and June (the last data available), sales of blended gasoline were record high even though prices of gasoline and alcohol came down after the war.

Some news reports suggested blenders were using alcohol and setting up alcohol programs. Possibly, they were getting a jump on the Clean Air Act Amendments of 1990 and lining up suppliers early. Another possibility is that consumers are economizing wherever possible and because blended gas is usually cheaper, sales may be up.

In October 1991, the largest alcohol producer announced it was now pricing alcohol relative to its value as an octane and oxygenate component. This has caused alcohol prices to rise above regular unleaded gasoline even with the Federal blending credit. Blenders that add or top-off regular unleaded gasoline with ethanol may stop the practice. Regular unleaded top-off blending will not make economic sense except where an additional State incentive is present.

Wet mill alcohol producers, as well as starch and corn sweetener producers, can offset part of the cost of the corn by selling the byproducts of wet milling. These byproducts are corn oil, corn gluten feed, and corn gluten meal. Vegetable oil prices tend to move together because food manufacturers can substitute other oils if one oil is in short supply and relatively higher priced. In the United States, soybean oil is most plentiful and therefore tends to determine prices. Similarly, soybean meal is the most plentiful of the protein meals. However, most of the corn gluten feed is exported to the EC and tends to carry a premium price relative to soybean meal. In 1991/92, soybean meal prices are expected to increase from 1990/91, but soybean oil prices are forecast to decline. Taking these changes into account and projecting net corn cost, wet millers can expect the net cost of corn to be 10 percent higher than in 1990/91.

Figure 6
Vegetable Oil Prices

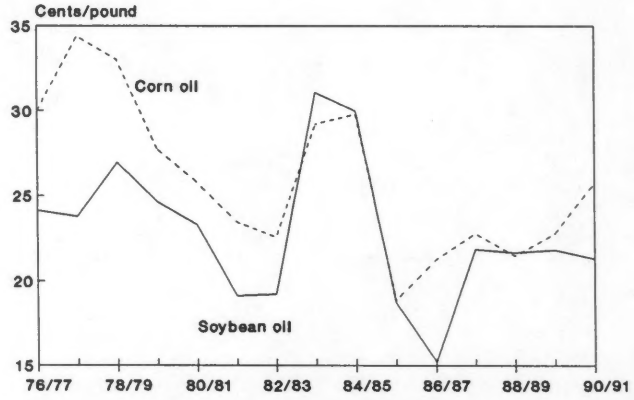


Figure 7

## Protein Feed Price

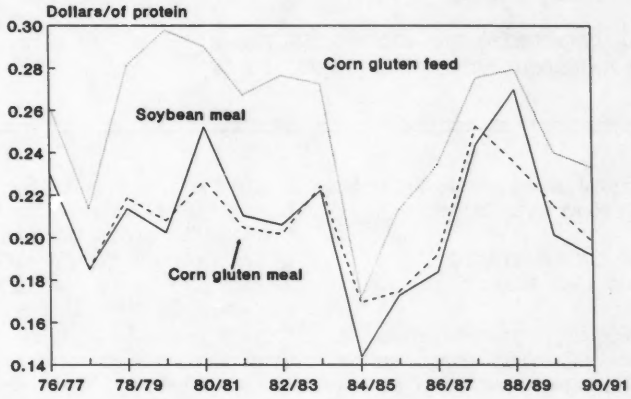
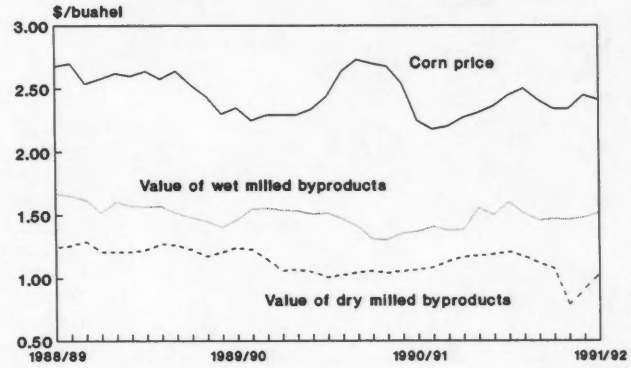



Figure 8

## Illinois Corn Prices and Values of Wet and Dry Milling Byproducts from Alcohol




Dry mill alcohol producers have had higher net corn costs than the wet millers because their only byproduct is distillers' dry grains and solubles. However, dry millers have a higher yield because they can theoretically use all the starch to produce alcohol. In 1991/92, dry mill ethanol producers can expect their net corn costs to increase about 5 percent from 1990/91.

Dry milled and alkaline cooked products are expected to increase corn use about 1 percent from a year earlier. Demand for brewers' grits have remained about constant in recent years and are expected to remain about the same in 1991/92. Food use of corn is expected to grow a little, mainly because of the continued growth of the population with Spanish ancestry and the popularity of Spanish food dishes by the general population.

Table 2--Corn: Food, seed, and industrial use 1/

| Year beginning September 1 | Wet-milled products | | | | Dry-milled alcohol | Dry-milled and alkaline cooked products | Seed | Total |
|---|---|---|---|---|---|---|---|---|
| | HFCS | Glucose and dextrose | Starch | Alcohol | | | | |
| | Million bushels | | | | | | | |
| 1975 | 45 | 162 | 116 | 5 | 20 | 154 | 20 | 522 |
| 1976 | 62 | 164 | 116 | 10 | 15 | 155 | 20 | 542 |
| 1977 | 80 | 170 | 124 | 10 | 20 | 158 | 20 | 582 |
| 1978 | 105 | 170 | 124 | 15 | 20 | 155 | 20 | 609 |
| 1979 | 127 | 170 | 120 | 25 | 20 | 158 | 20 | 640 |
| 1980 | 165 | 183 | 120 | 35 | 35 | 160 | 20 | 718 |
| 1981 | 185 | 183 | 130 | 83 | 35 | 162 | 19 | 797 |
| 1982 | 215 | 188 | 127 | 130 | 50 | 170 | 15 | 895 |
| 1983 | 256 | 189 | 147 | 150 | 50 | 164 | 19 | 975 |
| 1984 | 310 | 187 | 143 | 170 | 100 | 160 | 21 | 1,091 |
| 1985 | 328 | 188 | 152 | 185 | 127 | 161 | 19 | 1,160 |
| 1986 | 339 | 185 | 155 | 200 | 135 | 161 | 16 | 1,191 |
| 1987 | 359 | 187 | 167 | 200 | 136 | 163 | 17 | 1,229 |
| 1988 | 362 | 196 | 164 | 210 | 139 | 161 | 19 | 1,251 |
| 1989 | 369 | 207 | 172 | 222 | 140 | 161 | 19 | 1,290 |
| 1990 | 380 | 215 | 180 | 230 | 140 | 161 | 19 | 1,325 |
| 1991 2/ | 389 | 222 | 185 | 230 | 140 | 164 | 20 | 1,350 |

1/ Data are estimates based on production and sales figures from government and private industry.
2/ Estimate.

*Transportation Update*

# Barge Rates Up, Rail Rates May Rise

*The supply of transportation equipment will remain adequate. Increased soybean shipments by barge are likely to offset reductions in corn, stabilizing barge demand.*

Exports and domestic consumption of total grains and soybeans for 1991/92 are projected at 351 million metric tons, slightly below 1990/91. Corn exports are projected down nearly 9-percent, with domestic consumption up 2 percent. Increased soybean exports, up a projected 17 percent, will largely offset the reduced corn exports. Barge shipments account for 50-60 percent of corn exports and 60-70 percent of soybean exports. Barge volume is expected to remain near 1990/91 levels.

The projected 5-percent increase in wheat exports will also add to demand for rail shipments. The 9 percent decline in domestic use of wheat chiefly results from decreased feeding of wheat to livestock and poultry. Much of the feed wheat moved by truck in 1990/91, so demand for rail or barge service is not affected by this decline. Increased domestic use projected for corn and soybeans should also add to demand for rail service.

### *Changing Export Patterns Affect Internal Distribution Patterns*

In September, overseas exports of grain and soybeans, as measured by inspections for export, were down 10 percent from the prior month. Most of the decline resulted from sharply reduced exports of corn, sorghum, and soybeans through the Gulf ports. Corn showed the largest reduction, 22.2 million bushels or 18 percent, and sorghum and soybeans fell 8.6 and 6.3 million bushels, respectively. Exports through Pacific Coast ports, however, rose 18 percent as corn exports there increased 56 percent to 32.4 million bushels.

These changes in export patterns caused changes in the demand for rail and barge service. In September and October, rail shipments to ports accounted for 30 percent of all railed grain, in contrast to 16 percent the prior year. These increases caused total rail volume of grain to also average above a year earlier.

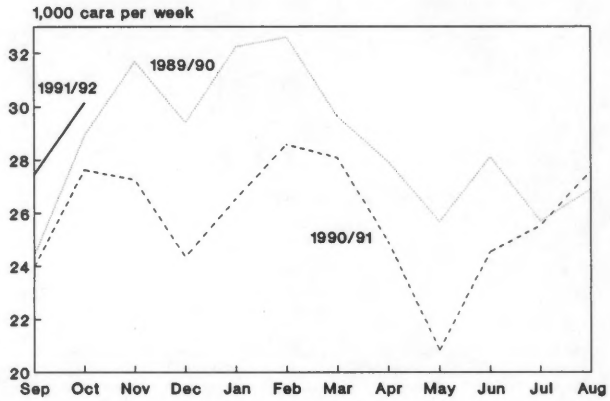
### *Rail Volume Averages Up from Last Year*

Rail shipments of grain and soybeans in September-October averaged nearly 28,800 cars per week, up 11 percent from the 1990/91 average and 12 percent above a year earlier.

Most of the increase resulted from sharp increases in rail shipments to Pacific Coast and Texas ports. Grain deliveries to Texas ports in September-October averaged 2,599 cars per week, 58 percent above 1990/91 and 156 percent above a year earlier. At the Pacific Coast ports, receipts averaged 4,018 cars per week, up 40 percent from 1990/91 and 62 percent above a year earlier.

Figure 9

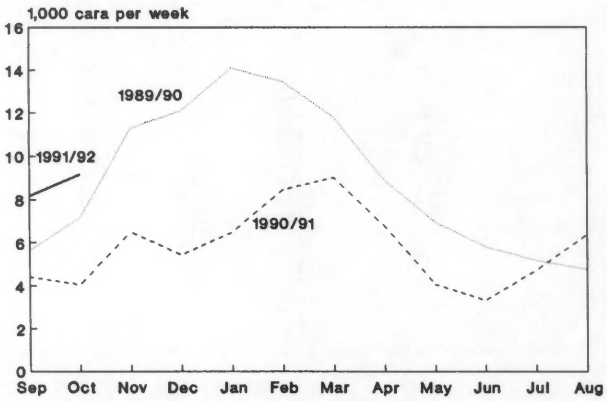
Rail Car Loadings of Grain and Soybeans




Weekly average.

Figure 10

Rail: Weekly Average Grain Unloadings




At Atlantic, Gulf, and Pacific ports.

With harvest nearly complete and total grain and soybean use now projected at about the same level as 1990/91, rail loadings of grain are not expected to rise further above October levels. Increased domestic feed grain use and larger wheat exports are expected to hold rail volume above 1990/91 levels.

On November 1, 1991, the number of jumbo covered hopper cars (4,000 cubic feet capacity or more) in active service had declined about 2 percent from January to 247,000 cars. Still, widespread car shortages were not reported during harvest and are not expected in the coming months. In January and February 1990, with essentially the same number of cars in active service, railroads accommodated more than 32,000 cars of grain per week, 12 percent above September-October 1991/92.

### *First-Quarter Rail Rates Projected Slightly Above Last Year*

The Bureau of Labor Statistics' rail rate index for grain averaged 111.4 (Dec. 1984=100) during September-August 1990/91. In September 1991, rates were 1 percent above a year earlier and unchanged from August at 112.2. Although the index dipped in October to 111.1, rail rates are projected to rise slightly above current levels through December. The Interstate Commerce Commission now estimates costs of rail operations, as adjusted for productivity, to increase 1.1 percent during October-December. Most of the increase results from a projected 2.1-percent rise in labor costs, resulting from the Presidential Emergency Board's recommendations. This board was convened to end a rail strike in April 1991.

### *COT Bids Remain Unchanged*

Minimum acceptable bids for 54-car unit trains and single cars under the Burlington Northern's Certificate of Transportation Program (COT) remained essentially unchanged between August and November 1991. These bids apply to shipments of corn, sorghum, or soybeans.

Unit train minimum bids in the West Corridor for January delivery of cars remained at $2,590 per car from August 26 to November 18, 1991. In the East Corridor, bids held at $1,788 per car.

Minimum bids for single cars also held constant. Bids were $3,650 per car and $860 per car in the West and East Corridors, respectively.

The corridors used in the COT program are defined as follows:

Unit Train West Corridor: Sioux City, Ia., to Pacific Northwest export ports.

Unit Train East Corridor: Sioux City, Ia., to Mobile, Ala., for export.

Single Car West Corridor: Sioux City, Ia., to Burlington Northern stations in Washington or Oregon.

Single Car East Corridor: Lincoln, Neb., to Kansas City, Kan. or Mo.

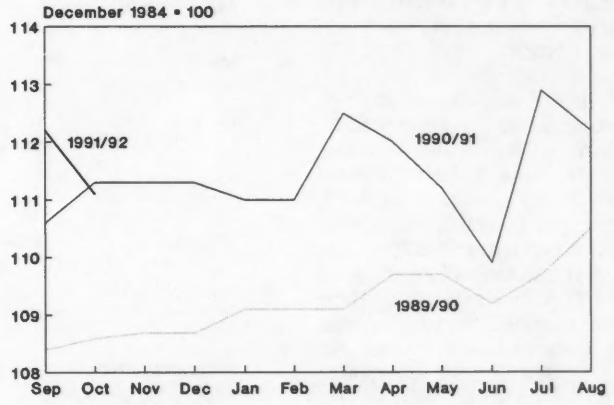
Shipments to other points within a corridor may be made at premiums or discounts based upon a special published tariff. The large difference in minimum bids between corridors chiefly reflects differences in lengths of haul.

### *Reduced Export Volume Lowers River Shipments*

Reduced exports of grain and soybeans through the Gulf caused barge shipments of these commodities in September to fall 13 percent from August to 3.3 million tons. In contrast, 3.6 million tons of grain were shipped a year earlier. Barge volume rose 6 percent in October to 3.5 million tons, 3 percent above the prior year. Shipments of grain by barge averaged 3.4 million tons in September-October 1991, the same as a year earlier.

Figure 11

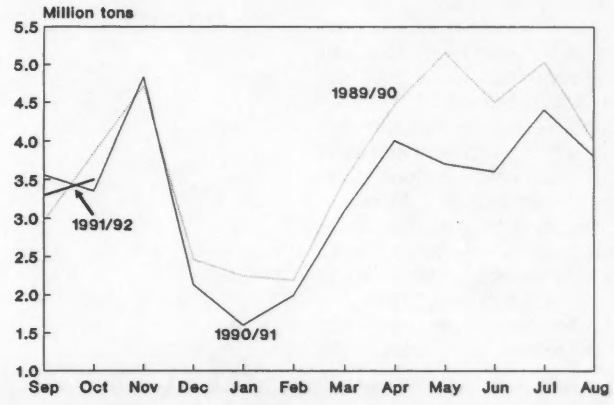
Rail Rate Index for Grain




Bureau of Labor Statistics.

Figure 12

Average Monthly Shipments of Grain




Mississippi River and Illinois waterway.

Total barged grain averaged 3.4 million tons per month over 1990/91, 10 percent below the prior year.

Preliminary indications are that barge volume on the Mississippi River in November declined from October. At mid-month, shipments through Lock & Dam 27 averaged 536,000 tons per week, down 40 percent from October, and 57 percent below a year earlier.

Historically, barge volume on the Mississippi River system rises sharply in November (4.7 million tons during 1981/82-1990/91), but falls to below 2 million tons per month in January and February as freezing weather closes the Upper Mississippi and lowers water levels on the Lower Mississippi. Because of the forecast drop in corn exports from 1990/91, grain shipments by barge are expected to remain near a year earlier in the 1991/92 crop year.

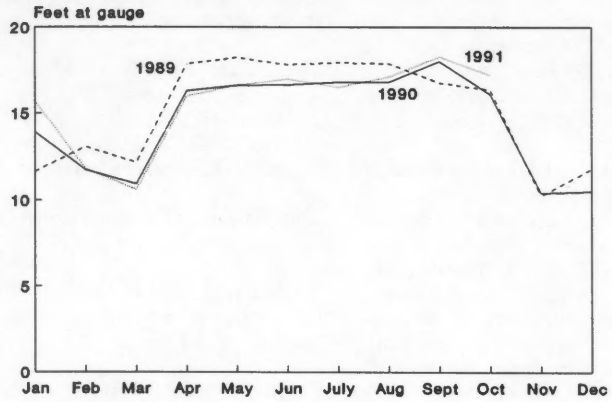
### *Missouri River Levels Fall Sharply as Navigation Season Ends*

The closing of the Missouri River to navigation, previously announced by the U.S. Army Corps of Engineers, took place on November 1, 1991. Between October 29 and November 19, 1991, water levels at Sioux City, Ia., as measured at the flood gauge, fell 29 percent to 10.3 feet. At Kansas City, the water dropped 23 percent to 9.1 feet. These depths are essentially the same as a year earlier when early closing also occurred. At this time, the reduction in water flow from the Missouri into the Mississippi appears to be no more severe than in 1990.

### *Navigation Conditions Slightly Worse Than Last Year*

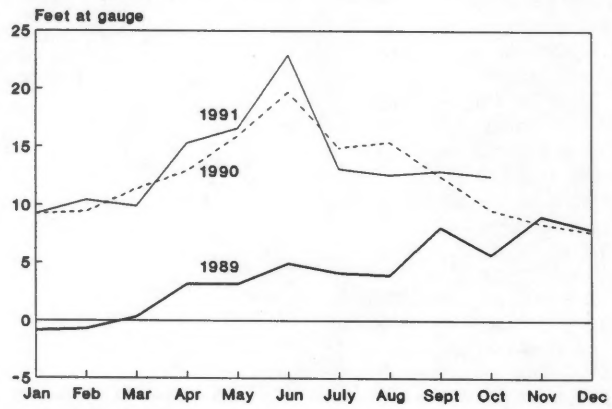
July-September water levels at St.Louis remained lower than in the prior year and significantly below the 1944-88 average. Still, there are no indications that the extreme low water conditions of 1989/90, when negative flood gauge readings were found during November-January, are about to return. In July, the St. Louis gauge averaged 11.6 feet, 13 percent below a year earlier. During October, the gauge averaged 3.6 feet, 50 percent below the 45-year average and 14 percent below a year earlier. The barriers to navigation resulting from

Figure 13
River Stages at Sioux City



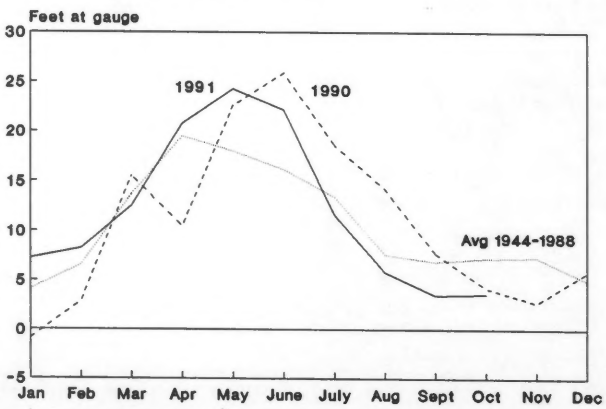

Measured at flood gauge.

Figure 14
River Stages at Kansas City




Measured at flood gauge.

Figure 15
River Stages at St. Louis




Measured at flood gauge.

low water levels brought upward pressure on barge rates for export grain shipments.

Shallow water commenced to inhibit navigation at Memphis in July. Water levels continued to fall through October. The Memphis flood gauge averaged 6.1 feet for July, dropping to -3.8 feet for October. Mid-November showed rising levels to 1.2 feet. These levels are not unusual. The 1944-88 July-November average for Memphis ranges from -4.6 to -9.0 feet. In late October, at the request of the U.S. Coast Guard, barge operators voluntarily reduced tow sizes to 25 barges, down from 30 barges.

In mid-November, the water at St. Louis and Memphis rose to 7.1 and 0.6 feet, respectively, but is expected to remain low through February. Some barge operators have withdrawn their equipment from Minnesota because of ice conditions in the Upper Mississippi River. This increased the number of barges available for loading at downstream points. As a result, rates commenced to fall in November.

### *Volatility Continues in Barge Rates*

In July 1991, barge rates from Peoria and St. Louis to New Orleans rose 18 percent from June to $6.65 per ton and $4.90 per ton, respectively. By October, rates had increased to $10.67 per ton (Peoria) and $8.43 per ton (St. Louis), 90 and 103 percent, respectively, above June. The July increases were chiefly caused by increased grain volume on the Mississippi River system. Volume in August and September, while above seasonal averages, declined from July.

In August, the number of grain barges either empty or awaiting unloading in the New Orleans area commenced to increase. Such barges are many days' travel from upstream loading points and are temporarily removed from the market. In June, about 1,700 barges remained in the New Orleans area each week. By October, 2,335 barges, on average, about 14 percent of total, were in the New Orleans area. The reduction in barges immediately available for loading squeezed barge supply and contributed to the rise in rates.

Additionally, barge rates have not kept pace with inflation. While the cost of operating tow boats has risen as fuel and labor costs eased upward during 1990/91, barge rates from Peoria averaged 32 percent above 1975. Rates from St. Louis in 1990/91 averaged only 16 percent above 1975. Since 1980, inflation could have been expected to cause a 59-percent increase in rates. As a result, tow boat operators felt compelled to seek rate increases.

Preliminary indications are that barge rates declined in November as the growth in the number of barges in the New Orleans area commenced to decrease. At the end of the second week, 2,350 barges remained between Baton Rouge and New Orleans, down 20 percent from the first week and very slightly higher than October's average. Preliminary rate estimates for November show Peoria down 29 percent from October and St. Louis down 34 percent.

### *Truck Costs Up from August*

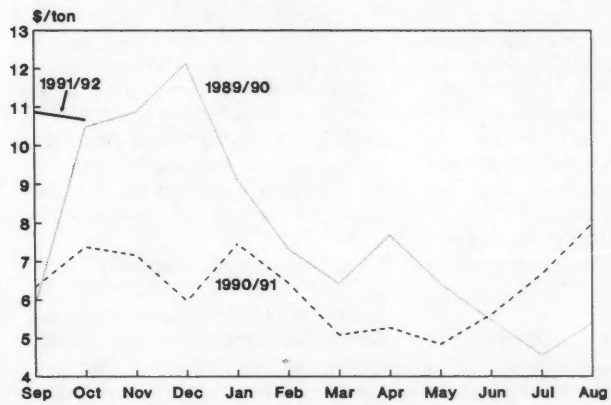
After declining through the first 8 months of the year, costs of operating tractor-trailers rose fractionally in October. Costs in August and September 1991 averaged $1.23 per mile, down 10 percent from January. In October, increases in fuel and wage costs caused total costs to rise 1 cent per mile. Truck costs, however, remain well below the $1.38 per mile of October 1990, a 10-year high. Costs are expected to continue to edge up into 1992, but remain well below fourth-quarter 1990 levels.

### *Diesel Prices on the Increase*

Diesel fuel prices bottomed out in July, averaging $1.10 per gallon. Since then, prices have moved steadily upward to average $1.22 per gallon, up 11 percent, in mid-November. Still, diesel prices remain 32 percent below October 1990 and are not expected to return to fourth-quarter 1990 levels this year.

Figure 16

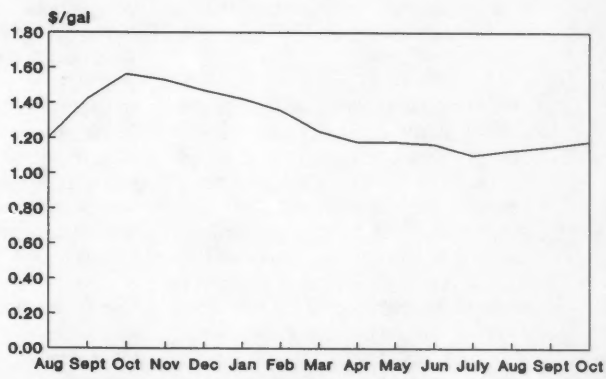
Barge Rates to New Orleans




From Peoria, Il.

Figure 17

Monthly Average Diesel Fuel Price, 1990-91




Interstate Commerce Commission.

# World Production and Consumption Expected To Decline in 1991/92

*Declines in foreign production and use stem largely from events in the Soviet Union. Changes in the Soviet Union and elsewhere weigh heavily on the outlook.*

Global production of coarse grains is forecast to drop 4 percent in 1991/92 to 801.5 million tons. Because of larger carryin stocks than the previous year, total world supplies are forecast to fall only 2 percent. Global consumption is forecast to decline nearly 2 percent to 809 million tons, the lowest in 3 years. A decline in use in the USSR is expected to outweigh a slight increase in consumption in the rest of the world.

With global consumption likely to outpace production, world ending stocks are projected to fall 5 percent to 128 million tons in 1991/92. The resulting ratio of ending stocks to use of 15.8 percent indicates a relatively tight supply situation. While the projected level of stocks is low by historical standards, it would still be above the recent low of 124 million tons in 1989/90.

### *Widespread Economic and Political Change Confuse the Outlook*

Grain production, consumption, and trade patterns are undergoing substantial changes in many countries, whether the result of specific agricultural policy reforms or as a byproduct of other changes. Some events, such as those in the Soviet Union, are having an immediate effect on the world grain market while others will have more impact over the next few years.

Of foremost importance for the 1991/92 outlook is the rapid transformation—and possible breakup—of the Soviet Union. The Soviet shift away from a centrally planned economy may have many potential benefits over the long run, but the immediate consequences include a decline in economic growth, an apparent drop in grain consumption, and problems financing imports. While a drop in Soviet production is largely weather-related this year, a reduction in procurements of domestic grain goes beyond declining production, with few economic incentives to deliver to the State. Although available domestic supplies are down sharply, financial constraints will limit the USSR's ability to import.

Eastern Europe is also undergoing radical shifts in economic and political structures. As the countries in the region move toward market economies, economic growth also has faltered. Cuts in subsidies and higher prices are contributing to a slump in domestic demand. Large exportable surpluses of grain have developed in some East European countries this year, reflecting good harvests as well as lagging consumption. Finding cash markets for potential exports will be difficult, and most trade will likely be barter. In addition, some exports may move under trilateral deals financed by the EC.

A number of other countries have started significant policy reforms. In Mexico and Argentina, changes in macroeconomic policies are beginning to bolster growth prospects, in large part by lowering high inflation, making investment more attractive, and reducing government involvement in the overall economy. For Mexico, improved economic growth would suggest higher import demand for agricultural goods. However, government farm policies have also dramatically increased price supports for corn growers, contributing to larger corn crops and lower imports. In Argentina, there are signs of more radical agricultural reforms, including privatization of grain marketing and transportation, that will boost plantings and enhance the country's export competitiveness.

The EC continues to discuss reform of its Common Agricultural Policy (CAP). Only relatively minor adjustments for grains have been announced so far, such as a new 1-year set-aside scheme aimed at reducing harvests in 1992. This program, which supplements an existing 5-year program, is expected to have only a minor impact on reducing grain output (and surplus supplies). However, the possibility of more fundamental reforms to EC policies appears less remote than in earlier years, prompted by the forecast of record ending grain stocks in 1991/92 and growing budgetary outlays. In addition, Germany recently announced it would support a significant reduction in subsidized EC grain exports. The EC's consideration of reforms also keeps alive the possibility of a GATT agreement.

### *Foreign Production Highlights*

Foreign coarse grain output is forecast at 582.8 million tons in 1991/92, down more than 20 million tons from the previous year's record. Although substantial declines are forecast in barley, rye, and oats, foreign corn production is forecast to increase 4 percent to a record 288 million tons.

The single biggest change is expected in the Soviet Union, generally the largest foreign producer, whose coarse grain crop is forecast at 85.5 million tons, a decline of nearly 28 million tons from 1990/91, when it had an excellent harvest. Most of the drop in Soviet production is due to lower yields because of less favorable growing conditions. Area is expected to drop only slightly, while average coarse grain yields are forecast down by about a quarter from the year before. Soviet wheat production is also forecast to be down sharply.

The total Soviet grain crop is forecast at 175 million tons, compared with 235 million in 1990/91. Some Soviet reports indicate that the crop may be even lower. However, because of extensive changes, the reports may not be comparable to previous years.

Conversely, Eastern Europe is forecast to register an 18-percent rise in coarse grain output, as improved growing conditions boosted yields. Nearly all of this forecast increase of more than 9 million tons is expected in corn, making it the region's largest outturn since 1987/88. Yugoslavia is experiencing the largest gain, with production nearly doubling, followed by Hungary. Corn is a major crop in Eastern Europe, second only to wheat. However, output is quite erratic, reflecting susceptibility to summer heat and dryness at critical times in the main growing areas in the Balkan states.

In the EC, higher corn production similarly accounts for virtually all of a forecast 4-million-ton rise in coarse grain output. Most of this gain is in France, the major producer, which recovered from drought, with smaller gains by Greece, Spain, and Italy. EC barley is forecast virtually unchanged.

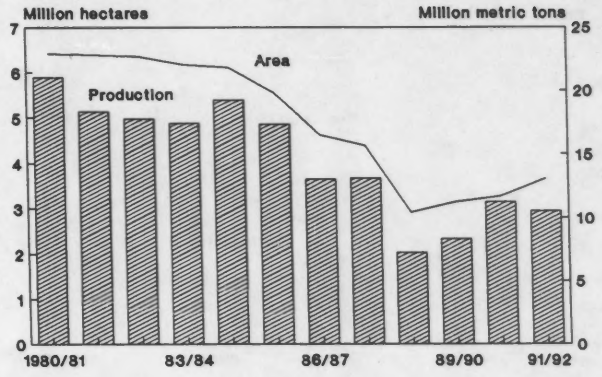
In Mexico, a second consecutive record corn crop is expected. However, this will be more than offset by a reduction in sorghum, and total coarse grain output is forecast to fall about 2 percent. Mexico's corn acreage has risen significantly in the last 2 years because of the incentive of high guaranteed prices to farmers, although this has pulled some area out of sorghum. Coupled with favorable weather, the jump in corn plantings has led to bumper corn crops in both 1990/91 and 1991/92.

### *South American Crop Prospects*

Planting of the main 1991/92 coarse grain crops in Argentina and Brazil is nearing completion. Farmers in Argentina are responding positively to more stable economic conditions and policy reforms by the government and are expected to increase area planted to coarse grains. However, assuming average yields, production will decline in 1991/92, with corn forecast at 7.2 million tons and sorghum at 2.3 million tons, both down 8 percent. Excellent growing conditions led to record yields of both corn and sorghum in 1990/91.

Inflation is down dramatically in Argentina, encouraging farmers to invest more and increase input use. Increased investment is also being supported by heightened availability and affordability of credit as interest rates have dropped. Policies that include the elimination of export taxes and streamlining of the marketing system could stimulate an increase in total crop area in Argentina in the next few years, given the abundance of available land. In recent years, farmers have shifted much land out of coarse grains into oilseeds.

Figure 18
Argentina Coarse Grains
Area and Production



1991/92 forecast.

Corn production in Brazil is expected to rebound about 11 percent in 1991/92, assuming a recovery from poor weather. The availability of credit appears adequate to support corn area similar to last year, while only a small gain in soybean area is expected.

### *Foreign Consumption To Decline*

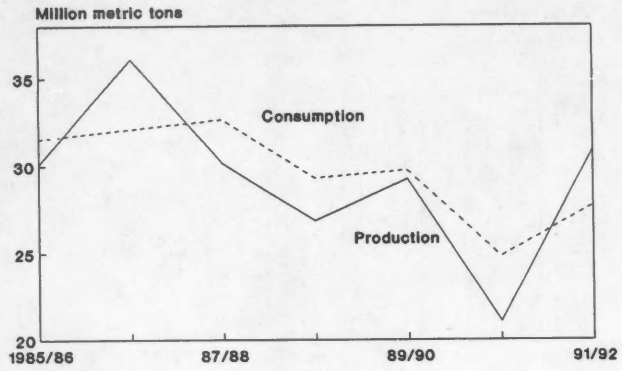
Foreign use of coarse grains in 1991/92 is forecast to fall 2.5 percent to 628 million tons, the lowest since 1986/87. Most of the decline stems from a prospective drop in Soviet use. Aggregate use by other foreign countries is expected to increase almost 1 percent in 1991/92.

Soviet consumption of coarse grains is projected to fall about 20 million tons in 1991/92, following a 4-million-ton reduction the previous year. Most of the decline will be in livestock feed. Because of tight wheat supplies, the Soviets will not be able to make up the shortfall by feeding more wheat. Thus, reductions in livestock inventories in coming months will largely hinge on the amount of feed grain imports. As of July 1, 1991, the USSR reported cattle numbers down nearly 5 percent from a year earlier, hogs down about 10 percent, sheep and goats down 9 percent, and poultry about equal. Depending on slaughter decisions, the production of meat and livestock products could also fall.

Much of the dramatic drop in Soviet use expected this year stems from the smaller crop. In the past, the Soviets tended to import more to cushion the impact of a short crop. However, the Soviets will not be able to do this in 1991/92 because of financial constraints. In addition, distribution of domestic grain supplies continues to worsen. The share of grain procured by the Central Government is reportedly down. Many of the Soviet republics have banned the export of grain from their farms to other republics. As the old system begins to crumble, new market structures have yet developed to replace it.

Excluding the Soviet Union, overall foreign use is projected to grow nearly 1 percent in 1991/92, and includes a forecast rise in consumption in the EC and Eastern Europe, both large users. Slight increases are likely in both regions as corn production and availability recover from drought reductions in the previous year. However, without CAP reform, the longer trend in EC coarse grain use remains firmly downward. East European use is also moving downward as consumers and producers adjust to reforms. The longrun trend is less clear because of more erratic production patterns and the different pace of market

Figure 19
Eastern Europe Corn
Production and Consumption




1991/92 forecast.

reforms in the various countries in the region.

Among other major foreign consumers, the forecast reflects stagnant or falling demand. For example, Japan's feeding of coarse grains has largely leveled out with a rise in meat imports under increased market liberalization. In South Korea, feeding of wheat will continue high in 1991/92, after a sharp expansion in 1990/91, depressing coarse grain use.

## World Coarse Grain Trade Projected Down 2 Percent

*U.S. exports and market share are expected to be the lowest since 1985/86. Little growth is forecast in Soviet imports, despite widespread use of export credits.*

World trade in coarse grains in 1991/92 is projected at 83.2 million tons, compared with 84.8 million in 1990/91.[1] Small declines are projected in world corn and sorghum trade, while barley is projected up slightly. A relatively low level of prospective Soviet imports is a key factor in the stagnant outlook for world trade and U.S. exports. The United States is forecast to export 46.9 million tons of coarse grains, a drop of 9 percent, and the lowest since 1985/86. This would lead to a U.S. share of 56 percent, down from 61 percent in 1990/91, and also the lowest since 1985/86.

Competitor coarse grain exports are projected to rise 9 percent in 1991/92. Among major competitors, Canada, Argentina, the EC, and South Africa are expected to increase exports significantly, while China and Thailand show little change, and exports by Australia decline.

[1] All trade years referred to in this section are October-September and exclude intra-EC trade unless otherwise specified.

### *Soviet Imports To Remain Flat*

Despite large potential needs, imports by the Soviet Union will be constrained by the lack of foreign exchange again in 1991/92. Imports of coarse grain are forecast at 15 million tons, up slightly from the 14.5 million estimated for 1990/91. Soviet corn imports are forecast at 9 million tons, down from 10.1 million, and barley at 5.5 million, up from 4.3 million. Wheat imports for 1991/92 are forecast to increase from 14.8 million tons to 21 million. These import forecasts are contingent on use of substantial amounts of financial assistance or alternatives to traditional cash purchases.

In recent months, Soviet imports of grain and other agricultural products have become nearly totally dependent on exporter credits, aid packages, and barter. Decisions by creditors are being complicated by the erosion of central government control and difficulties in assessing Soviet creditworthiness. The bulk of the grains provided by foreign suppliers under these arrangements has been wheat. Most coarse grains from foreign suppliers will consist of barley, mainly from the EC and Canada.

Canada, which is only a small corn exporter, recently sold the Soviets a reported 300,000 tons of corn under credit. While there is unlikely to be much additional export credits for corn from competitors, the Soviets are expected to obtain additional corn under barter or other arrangements from China and Eastern Europe. Corn (and many other agricultural goods) are bartered for other commodities such as oil, gas, or cotton, often through direct arrangements with individual Soviet republics, bypassing central authorities. China has been supplying the USSR about 1 million tons of corn per year recently. Given large exportable supplies in Eastern Europe, estimated in the range of 1 million to 3 million tons, some exports to the USSR are expected through barter and possibly under a food aid package financed by the EC.

So far in 1991/92, all of U.S. corn sales to the Soviet Union has been under GSM 102 credit guarantees. As of November 14, the Soviets had purchased 3.3 million tons (September-August year). These sales were part of the total credit offering of $1.5 billion first announced in June, 1991. On November 20, the United States announced an ad-

ditional $1.25 billion in credit guarantees and $165 million in donations. Under this program, $500 million of export credit guarantees will be made available immediately, and the remainder will be released in $250 million tranches on February 1, March 1, and April 1.

### *U.S. Corn Exports To Fall*

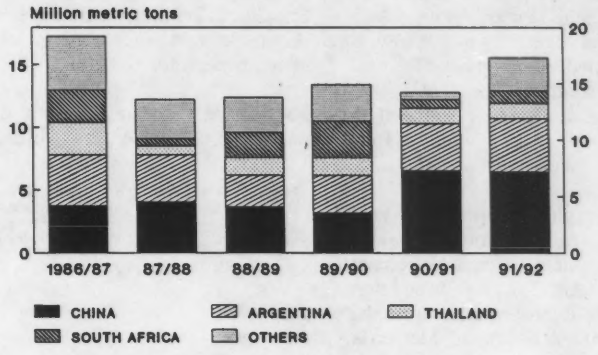
U.S. corn exports are forecast to decline 10 percent in 1991/92 to 40 million tons, the lowest since 1986/87. Weak imports by major customers, especially the USSR, Mexico, and South Korea, a drop in import needs in both the EC and Eastern Europe, and higher exports by competitors account for most of the forecast decline.

Mexico's corn imports are projected to decline to just 1.5 million tons in 1991/92, the second straight drop. In 1989/90, its imports reached 5 million tons, virtually all from the United States. A dramatic increase in domestic corn supplies accounts for this change. South Korea is again expected to import sizable amounts of wheat for feeding, and its corn imports are forecast to fall 11 percent in 1991/92, after falling 8 percent the previous year. China is also expected to capture a large chunk of this market from the United States as in 1990/91, by selling at lower prices.

Because of sharply higher corn production in both regions, U.S. exports to the EC and Eastern Europe are likely to shrink considerably. Furthermore, both regions will increase corn exports. EC corn exports, which dwindled to about 100,000 tons in 1990/91, are forecast to rebound to 500,000 tons. Most U.S. sales to the EC this year are expected to go to Spain under terms of the U.S.-EC Enlargement Agreement. Although the agreement is scheduled to expire at the end of calendar 1991, after being extended for a year, sales and shipments will extend into 1992. Exports to Spain have averaged about 1.5 million tons a year over the 4 years of the agreement.

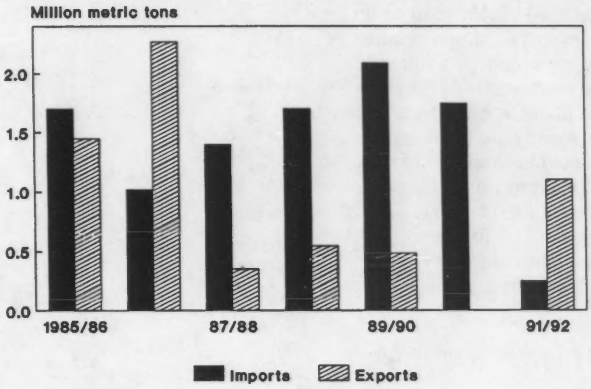
About half of the 1.2 million tons of U.S. corn exported to Eastern Europe in 1990/91 were under concessional terms. Eastern Europe's corn imports from all sources are forecast at just 300,000 tons in 1991/92, down from 1.8 million, while its exports are projected to climb

Figure 20
**Competitor Corn Exports Forecast To Be Highest in 5 Years**




1991/92 forecast.

Figure 21
**Eastern Europe Corn Trade**




1991/92 forecast.

from virtually nothing to 1.1 million tons. The region has the potential to export even more, with reports of very large surpluses in Hungary and Yugoslavia. For the latter, there are obvious concerns about transport and marketing problems, given civil strife. Both countries face difficulties in selling to their traditional outlet, the Soviet Union, but are likely to ship some corn there through barter. Hungary could also possibly supply corn under trilateral arrangements financed by the EC.

### *Small Gains in Barley; Sorghum Trade To Slip Further*

World barley trade is projected to increase 2 percent in 1991/92 to 18.2 million tons. This outlook is highlighted by abundant exportable supplies in the EC and Canada, and expected increases in purchases by Saudi Arabia and the Soviet Union, the two largest importers. U.S. barley exports are projected to rise about a third, from 1.4 million to 1.9 million tons, mainly on the strength of sales under EEP.

The world sorghum market will be relatively tight again in 1991/92 because of tight supplies in the United States, the principal exporter, and only a modest increase in competitor exportable supplies. U.S. exports are projected to decline from 5.6 million tons in 1990/91 to 5.1 million tons, and competitor exports are projected up 300,000 tons to 2.2 million.

With sorghum prices expected to remain high relative to corn, imports are likely to be concentrated among a very few countries. Japan and Mexico will remain the main buyers. Venezuela, a major market as recently as 1988/89, is again expected to import corn for feed rather than sorghum in 1991/92. U.S. Government stocks have dropped to very low levels, sharply limiting food aid donations under Section 416.

Mexico's sorghum imports are projected at 3 million tons, equal to 1990/91, despite a forecast 19-percent decline in its domestic crop. In addition to the possibility that supplies from the United States will be limited, Mexico is likely to divert some corn from its large stockpiles into feed channels, replacing sorghum. Sorghum is the principal feed grain in Mexico and corn is primarily considered a food grain.

Argentina's exports are forecast to go up 300,000 tons to 1.6 million. Unlike its corn exports, which go to diverse markets, most of Argentina's sorghum shipments are likely to go to Japan, as in 1990/91. Australia's sorghum exports are expected to shrink 60 percent to just 100,000 tons in 1991/92, despite an anticipated gain in production. Higher domestic use for feeding is likely after drought reduced the availability of wheat for feed and damaged pastures.

### *Oat Market To Tighten Slightly*

World oats trade is expected to show little change in 1991/92. U.S. imports are projected up 10 percent to 1.1 million tons, remaining far above the level forecast for any other country. Imports by the Soviet Union are expected to remain low.

Crops among the major exporters are down in 1991/92, except for Australia. Production in Canada is estimated down 19 percent as farmers planted less area, in response to the relative expected revenues under Canada's new Gross Revenue Insurance Plan (GRIP). Crops in Sweden and Finland are down an estimated 11 and 33 percent, respectively. Yields in both countries have dropped from the highs of 1990/91, while area also decreased in both.

Australia's oat crop is forecast to rise 20 percent. However, increased domestic feeding is expected to use up most of the increase, dropping exports slightly. Supplies in Poland are also expected to decline because of a lower crop, leaving slim prospects for exports.

For Canada, Sweden, and Finland, the main exporters to the United States, the combined supply of oats is forecast to drop 11 percent in 1991/92. Large carryin stocks in Canada and Finland partly temper the decrease in production, keeping exportable surpluses relatively large. Finland and Canada are forecast to increase exports, while Sweden's decline. However, the combined carryout stocks of these three exporters are projected to decline nearly 50 percent.

Table 3--World coarse grain trade: Major exporters and importers by commodity, 1987/88-1991/92 1/

| Item | 1987/88 | 1988/89 | 1989/90 | 1990/91 2/ | 1991/92 3/ |
|---|---|---|---|---|---|
| | Million metric tons | | | | |
| CORN | | | | | |
| Exporters: | | | | | |
| U.S. | 44.5 | 51.3 | 59.9 | 44.5 | 40.0 |
| Argentina | 3.7 | 2.5 | 3.0 | 3.7 | 4.2 |
| China | 4.1 | 3.7 | 3.2 | 6.6 | 6.5 |
| Thailand | 0.7 | 1.4 | 1.4 | 1.2 | 1.2 |
| South Africa | 0.6 | 2.0 | 2.9 | 0.7 | 1.0 |
| Others | 3.1 | 2.8 | 2.9 | 0.6 | 2.7 |
| Total | 56.7 | 63.8 | 73.2 | 57.2 | 55.6 |
| Importers: | | | | | |
| Japan | 16.7 | 15.9 | 16.2 | 16.1 | 16.2 |
| USSR | 7.9 | 17.9 | 17.8 | 10.1 | 9.0 |
| EC-12 4/ | 4.4 | 2.9 | 4.1 | 3.5 | 2.0 |
| Korea, Rep. | 5.0 | 5.7 | 6.1 | 5.6 | 5.0 |
| Taiwan | 4.2 | 4.2 | 5.3 | 5.3 | 5.5 |
| Mexico | 3.2 | 3.2 | 5.0 | 1.9 | 1.5 |
| China | 0.2 | 0.0 | 0.5 | 0.0 | 0.0 |
| East Europe | 1.4 | 1.7 | 2.1 | 1.8 | 0.3 |
| Brazil | 1.4 | 0.2 | 0.4 | 1.0 | 0.8 |
| Egypt | 0.0 | 1.2 | 1.4 | 1.5 | 1.8 |
| Others | 12.3 | 10.9 | 14.3 | 10.4 | 13.5 |
| Total | 56.7 | 63.8 | 73.2 | 57.2 | 55.6 |
| SORGHUM | | | | | |
| Exporters: | | | | | |
| U.S. | 6.1 | 8.1 | 7.3 | 5.6 | 5.1 |
| Argentina | 1.2 | 0.7 | 1.2 | 1.3 | 1.6 |
| Australia | 0.6 | 0.3 | 0.0 | 0.3 | 0.1 |
| Others | 0.5 | 1.7 | 0.5 | 0.4 | 0.5 |
| Total | 8.3 | 10.8 | 8.9 | 7.5 | 7.3 |
| Importers: | | | | | |
| Japan | 3.9 | 4.1 | 3.9 | 3.6 | 3.6 |
| Mexico | 0.9 | 2.3 | 3.0 | 3.0 | 3.0 |
| Taiwan | 0.3 | 0.1 | 0.0 | 0.1 | 0.1 |
| Venezuela | 1.7 | 1.0 | 0.1 | 0.0 | 0.0 |
| Israel | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 |
| USSR | 0.0 | 1.2 | 0.3 | 0.0 | 0.0 |
| Others | 1.1 | 1.7 | 1.2 | 0.7 | 0.5 |
| Total | 8.3 | 10.8 | 8.9 | 7.5 | 7.3 |
| BARLEY | | | | | |
| Exporters: | | | | | |
| EC-12 4/ | 7.0 | 9.0 | 6.7 | 7.5 | 8.0 |
| Canada | 3.5 | 3.4 | 3.7 | 4.3 | 5.0 |
| Australia | 1.6 | 1.4 | 2.4 | 2.6 | 2.0 |
| U.S. | 2.9 | 1.7 | 1.9 | 1.4 | 1.9 |
| Others | 0.9 | 1.3 | 0.6 | 2.0 | 1.4 |
| Total | 16.0 | 16.8 | 15.3 | 17.8 | 18.2 |
| Importers: | | | | | |
| Saudi Arabia | 4.8 | 4.6 | 3.3 | 4.2 | 5.0 |
| USSR | 2.3 | 3.2 | 4.4 | 4.3 | 5.5 |
| East Europe 5/ | 0.8 | 0.9 | 0.4 | 1.6 | 0.8 |
| Japan | 1.3 | 1.3 | 1.3 | 1.4 | 1.3 |
| Others | 6.8 | 6.8 | 5.9 | 6.3 | 5.6 |
| Total | 16.0 | 16.8 | 15.3 | 17.8 | 18.2 |
| COARSE GRAINS TOTAL TRADE | 82.9 | 94.2 | 100.0 | 85.0 | 83.0 |

1/ October-September year, excludes intra-EC trade. Totals may not add because of rounding. 2/ Preliminary. 3/ Forecast. 4/ Includes former East Germany. 5/ Excludes former East Germany.

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# Corn Cleaning Practices of U.S. Commercial Elevators

by Mark Ash, Brian Just, Bengt Hyberg and Kristi McComas[1]

**Abstract:** Results from a National Grain and Feed Association survey indicate the prevalence of corn cleaning in the United States. Elevators throughout the survey cleaned an average of nearly 40 percent of the corn handled. Average cleaning cost ranged from 2.2 to 2.8 cents per bushel, depending on the amount of broken corn and foreign material removed.

**Keywords:** Cleaning, BCFM, discounts, elevators.

Title XX from the 1990 Food, Agriculture, Conservation, and Trade Act outlines actions to be taken by USDA to enhance grain quality. Among the provisions is the mandate to:

> study costs and benefits to the U.S. grain industry, from producer to end user, of marketing cleaner grain. The study must identify (1) the need to establish new or revised current factors relating to grain cleanliness; and (2) appropriate limits for cleanliness factors taking into consideration the technical ability and practicability of the commercial market to comply with such limits, the economic benefits and costs to the grain industry, and domestic and international demand.

Data on the extent of grain cleaning in the United States have not been available in the past. This article summarizes the responses from a nationwide survey of commercial elevator managers conducted by the National Grain and Feed Association (NGFA) in April 1991.

## Nature of the Survey

In the NGFA survey, elevator managers were asked questions on grain purchasing, cleaning, handling, and storage practices. Information on elevator cleaning operations, receiving, and loadout capacity was also requested. Questionnaires were sent to each of the 6,237 warehouses in the United States that have Uniform Grain Storage Agreements (UGSA) with the Commodity Credit Corporation (CCC). This mailing produced 895 usable responses, representing about 17.5 percent of the storage capacity of all U.S. elevators having a UGSA with the CCC. From this sample, 758 elevators handled corn.

For those elevators handling corn, 92.7 percent of the responses were country elevators, with inland terminals, river, and export elevators accounting for 4.9, 1.2, and 1.1 percent, respectively. Country elevators from the sample handled 876.5 million bushels.

Export elevators from the sample handled 103.7 million bushels of corn, or about 6 percent of 1990/91 U.S. exports. The following results represent unweighted data from the survey respondents.

## Discounts for BCFM

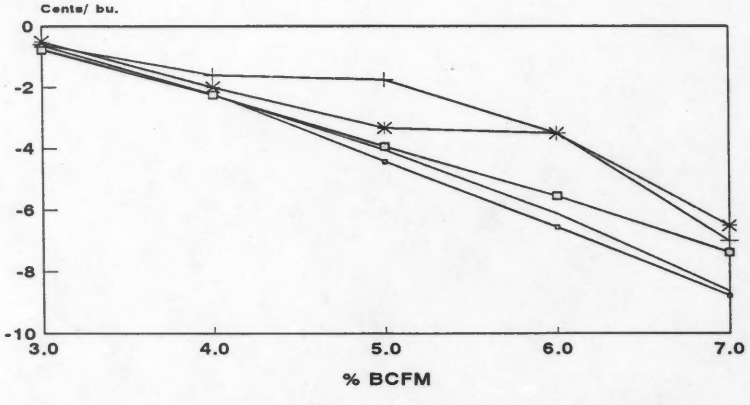
Discounts for broken corn and foreign material (BCFM) are common because this is a grade-determining factor. The discount for corn containing 4-percent BCFM averaged 2.3 cents per bushel (figure A-1). Elevators that cleaned corn were assessed BCFM discounts that were about 30 percent higher than elevators that did not clean (figure A-2). The Northern Plains generally had larger discounts (figure A-3).

Only about 1 percent of the elevators responding to the survey paid premiums for corn of less than 3-percent BCFM. The elevators that offered premiums paid an average of 2 cents per bushel.

## Elevator Cleaning Capacity

According to the survey, about 65 percent of the responses received from elevators handling corn had grain cleaners. An elevator was more likely to have a cleaner if it handled a large volume of grain. Nearly 80 percent of elevators that handled at least 2 million bushels of grain (generally export or terminal) had cleaners. However, only 29 percent of the river elevators handling corn indicated that they had cleaners. River elevators are typically high-turnover facilities that stress quantity

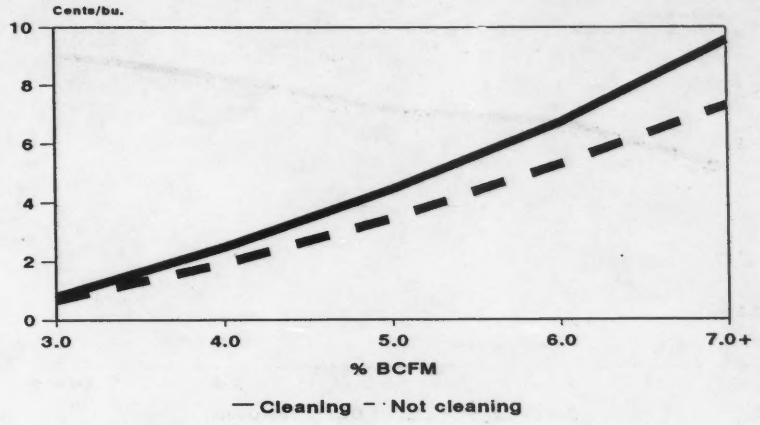
Figure A-1
**Corn BCFM Discounts by Elevator Type**




Source: National Grain & Feed Assn.

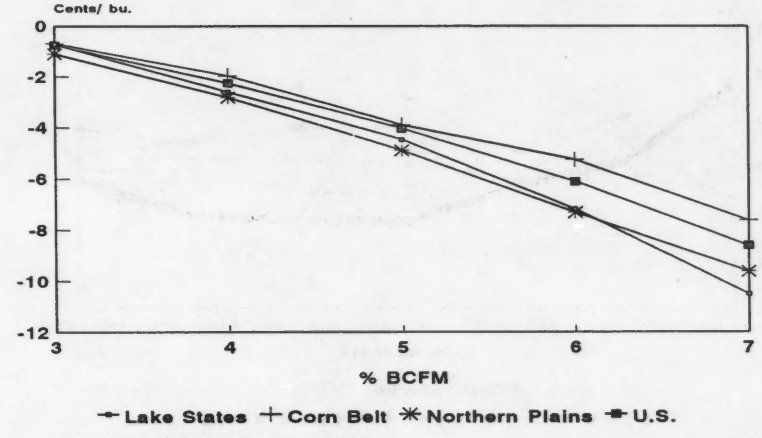
[1] The authors are agricultural economists with ERS.

Figure A-2
**BCFM discounts**




Source: NGFA survey

Figure A-3
**Corn BCFM Discounts by Region**




Source: National Grain & Feed Assn.

over quality, except to meet the specifications of particular contracts. However, country elevators had by far the largest share (77 percent) of the corn cleaning capacity from the survey. Thus, the country elevators that owned cleaners cleaned a larger proportion of the grain they handled.

Many elevators from the sample never approached the manufacturer's rated capacity for their cleaners. Elevators with cleaners had hourly operating capacities averaging 57 percent of their total hourly loadout capacity. Twenty-two percent of commercial elevators that handled corn had a cleaner but did not use it. The survey suggests that the rate that terminal and export elevators operated their cleaners relative to their loadout capacity was generally lower than country elevators. Average operating capacity per elevator was 10,550 bushels per hour. Average use was estimated at 400 hours annually. To clean all the corn they handled would require a use rate of about 700 hours per year.

## Potential Added Cleaning Capacity

Thirty-eight percent of the survey respondents indicated that they could install or increase the grain cleaning capacity within their current facility. A greater proportion of the river elevators (44 percent) reported that they could increase their capacity. The average capacity that could be added was nearly 9,500 bushels per hour. Assuming a workload of 700 hours per year times 288 elevators (38 percent of 758 elevators that handled corn), the potential added annual cleaning capacity works out to 1.9 billion bushels.

The feasibility of investment in additional capacity depends, in part, on the market offering elevators a more attractive economic incentive to clean grain than presently exists. Seventy-two percent of the sample respondents indicated that the cost to increase cleaning capacity would be less than $100,000. However, half of the large-capacity elevators (exceeding 5 million bushels) reported that they could only increase cleaning capacity at a cost exceeding $100,000.

## Frequency of Corn Cleaning

Based on the NGFA survey responses, elevators cleaned about 40 percent of the corn volume that they handle. All the export elevators and 90 percent of inland terminal elevators reported that they cleaned some corn, while only half of the country elevators and 29 percent of river terminals did. However, country elevators cleaned a far higher percentage of the volume they handled than did terminal or export elevators.

There is a strong positive relationship between the level of BCFM in inbound corn (on average) and the percentage of corn cleaned at an elevator. Elevators that averaged less than 2 percent BCFM cleaned 59 percent of the corn they handled. Elevators that averaged between 3- and 4-percent BCFM cleaned 71 percent of the corn.

The average BCFM content of corn received by all elevators in the survey was 2.9 percent. Elevators estimated that broken kernels accounted for two-thirds and foreign material one-third of the BCFM factor. There are more corn kernels broken with each handling. Subsequently, elevators along the marketing chain reduced the levels of foreign material and produced more uniformity through blending and cleaning. BCFM

levels in corn averaged about 2.9 percent for country elevator respondents, compared with 3.6 percent for export elevators. However, the range of BCFM content was nearly five times larger at country elevators. On average, broken kernels increased from 2.2 percent at country elevators to 3.2 percent at export elevators. In contrast, foreign material declined from an average of 1.6 to 0.6 percent.

## Stages of Corn Cleaning

Corn is usually cleaned more than once, as there is additional breakage with each handling. According to the survey, when corn is cleaned, 66 percent is cleaned at loadout. Elevators reported that when cleaning, 35 percent of the corn is cleaned upon receipt and 24 percent during storage or turning. River and export elevators had cleaning frequencies of only 10 and 13 percent, respectively, during storage or turning, which requires additional time for handling. Respondents from country and inland terminal elevators indicated that they cleaned over half the time upon receipt.

## Geography of Corn Cleaning

The amount of corn breakage and foreign material depends on many factors, including corn varieties, weather conditions, harvest, drying method, and handling practices. Of course, these may change for any given year. In the year covered by the survey, respondents from Ohio cleaned 68 percent of the corn they handled, the highest proportion of any major corn State. Elevators responding from Iowa, Minnesota, Illinois, and Indiana cleaned 49, 44, 32, and 21 percent of the corn handled, respectively.

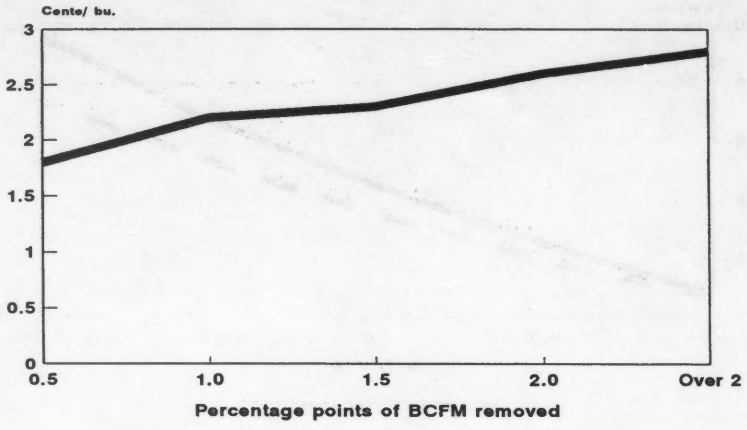
## Costs To Clean

A grain cleaner's operating cost depends on the volume cleaned and the hours of use. The amount of broken kernels and foreign material in incoming corn, the target level for BCFM, and the equipment efficiency determine the hours of use. These factors determine the total variable cost, which includes electricity, labor, and maintenance.

The cost of cleaning corn increases as the amount of BCFM removed increases. The weighted average of the cost estimates provided by the survey respondents was about 2.2 cents per bushel for a 1-percent reduction in BCFM and 2.8 cents for a reduction greater than 2 percent (figure A-4). When elevators cleaned, they removed, on average, 2 percent of the volume.

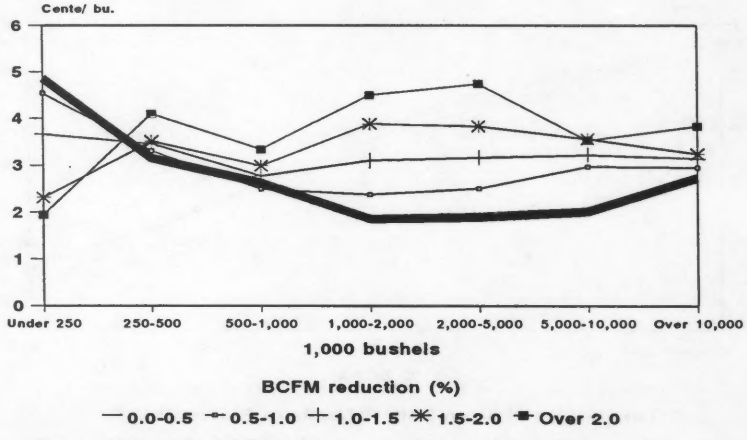
The cleaning cost also varied with the volume handled (fig. A-5). Elevators that handled between 500,000 and 1 million bushels of grain estimated a lower per-unit cleaning cost than elevators of other sizes, depending on the BCFM reduction.

Figure A-4
**Estimated Cost to Reduce BCFM**




Source: National Grain & Feed Assn.

Figure A-5
**Average Cost to Clean Corn by Elevator Volume**




Source: National Grain & Feed Assn.

## Disposition of Corn Screenings

The screenings and aspirated liftings generated by cleaning corn can be an additional source of revenue to the elevator. Survey respondents reported selling nearly 95 percent of their screenings directly to the livestock feed market. The operations that reported using the screenings in their own feed mills were generally small country elevators. In the year surveyed, elevators were unable to sell only 0.2 percent of the screenings (at an average disposal cost of nearly $20 per ton). Elevators sold

screenings throughout the year but they reported their greatest sales after completion of harvest in October, November, and December. The elevators that cleaned generally maintained sufficient storage space to hold 32 percent of their annual screenings production.

The average survey price of corn screenings was $64 per short ton, or about 80 percent of the 1990/91 national average farm price for whole corn. This price increased gradually throughout the crop year and was most likely influenced by the prevailing prices for other animal feeds. Most elevators sold screenings locally (about half were hauled less than 50 miles). Only 6 percent of the elevators that cleaned owned pelleting equipment. This equipment likely belonged to elevators that also had a feed mill.

## Reason for Cleaning

There are many reasons for cleaning corn. About 82 percent of the elevators that cleaned corn rated "to avoid discount" of great importance in their decision for cleaning (fig. A-6). Reasons of lesser importance included: contracts specified low-BCFM corn (especially important for terminal and export elevators); cleaning increased storability; cleaning improved air circulation in bins which permits storage at a higher moisture content, reduces shrinkage and energy costs; cleaning enhances test weight, reduces transportation costs; generates additional revenue from screenings sales; and improves cargo uniformity within and between export shipments.

So, why don't more elevators clean grain? Many cited economic reasons. Foremost among the reasons offered is that investment in grain cleaners can be expensive and difficult to justify given a limited demand for cleaned corn. Premiums for corn with low BCFM were nearly nonexistent among the survey respondents. Smaller country elevators indicated a concern for recouping the equipment cost while terminal and export elevators cited the high costs of retrofitting their facility. Other disincentives to cleaning cited were: time constraints, no local market for screenings, and difficulty handling and storing the screenings (fig. A-7).

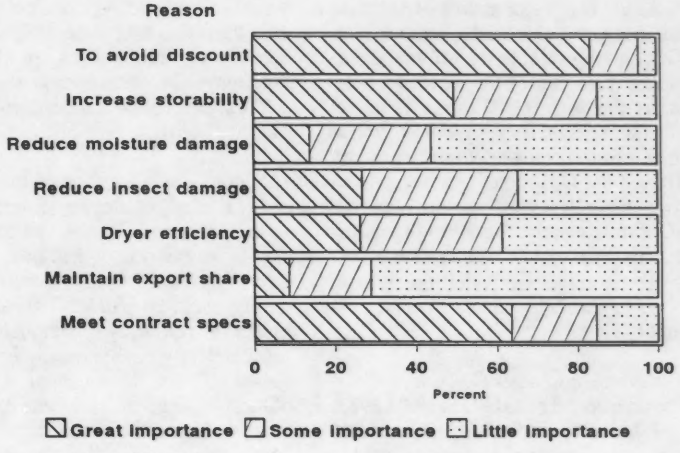
## References


Hill, Lowell and others. Impact of Separating the Factor of BCFM in Corn Grades: Interior Elevator Survey, AE-4670-4, Univ. of Illinois, Dept. of Agricultural Economics, June 1991.

_____. Impact of Separating the Factor of BCFM in Corn Grades: Market for Corn Screenings, AE-4670-3, Univ. of Illinois, Dept. of Agricultural Economics, May 1991.

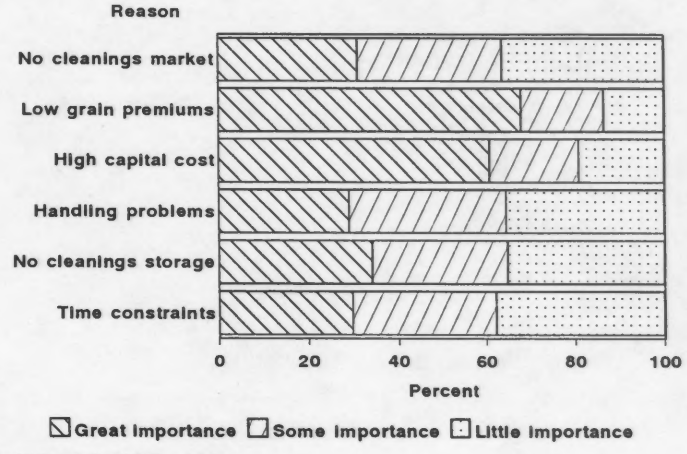
U.S. Congress, Office of Technology Assessment. Enhancing the Quality of U.S. Grain for International Trade, OTA-F-399, Washington DC, Feb. 1989.


Figure A-6
**Reasons for Cleaning Corn**




Source: National Grain & Feed Assn.

Table A-7
**Reasons for Not Cleaning Corn**




Source: National Grain & Feed Assn.

# Weather, Climate and Variability of U.S. Corn Yield

by Lloyd D. Teigen

**Abstract:** Equations relating corn yield to weather events are estimated for eight States and three multi-State regions. Variations of monthly rainfall and temperature around historical averages in the growing season (May through September) significantly explain variations around yield trends. The response to weather is nonlinear, with July precipitation and August temperature being the most important factors. The estimation period is 1950-88, while 1989 and 1990 test the model's predictions. Using weather through August, the model forecasts the 1991 crop at 7.5 to 7.9 billion bushels, with the U.S. average yield between 108 and 114 bushels/acre. Two scenarios of climate change were examined. A more variable climate and a hotter, drier, and more variable climate both reduce yields and increase yield variability, compared with the climatic baseline.

**Keywords:** Corn, yield, weather, climate, climate change, outlook.

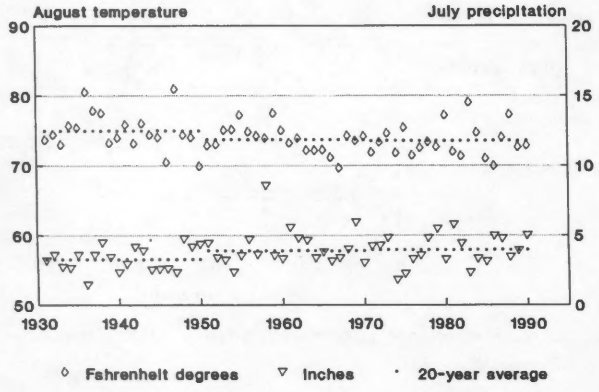
Weather is a major source of variation in crop yield. However, weather's effect on crop yield has a different distribution than that of the weather conditions themselves. Weather is cooler than the seasonal norm about as often as it is warmer, and wetter as often as dry (figure B-1). But bad weather reduces yield more than good weather improves it. Consequently, the average yield is less than the yield when weather is perfectly average. In addition, greater weather variability increases yield variability.

Unfavorable weather explains much of the corn output shortfalls in 1988, 1983, 1980, 1976, and 1974. Favorable weather for corn production occurred in 1987, 1986, 1982, 1981, 1979, 1978, 1972, and 1971. In this analysis, the most important weather factors affecting corn yield are July precipitation and August temperature. Moisture improves corn yield (up to a point), and heat hurts it during these months. Too much or too little moisture in May and June may delay planting or germination, while average May or June precipitation is just about right.

U.S. corn yields have varied more (relative to trend) in the last 15 years than in the previous 30 years. Yield variation in Missouri is typical of the Corn Belt (figure B-2). Greater weather variability could be part of a scenario of global climate change. Although no evidence clearly documents a change in global climate, the potential effect of climatic change on yield variability is examined later in this article.

Both level and variability of corn yield vary regionally. The higher average yields in the Corn Belt, for example, reflect advantages unique to the region. Yield variability also reflects weather events in each State. The weather effect varies across States, particularly in recent years, while residual variation differs little either across time or across States. Recognizing the regional differences improves the precision of yield forecasts.

Figure B-1
Corn Belt Weather




## Modeling Weather To Forecast Yield

A nonlinear model is specified that relates monthly temperature and rainfall to corn yields by State from 1950 to 1988. This model is then used to forecast corn yield. As in Thompson's model, most weather effects in this model are quadratic polynomials in temperature or rainfall measures (7). But unlike Thompson's, this model also attempts to capture an interaction between temperature and precipitation and uses an exponential function to represent some weather effects.

In this study, standardized weather variables are derived from data measuring heat and rainfall in degrees (F) and inches. These "z-scores" represent the departure from the 1950-88 average, divided by the 39-year standard deviation. Average weather generates a standard score of zero in each State and month, in lieu of—for example—a July average of 4.1 inches and 76 degrees in Illinois or 2.6 inches and 74 degrees in South Dakota. This transformation maintains the data's precision during estimation, while allowing qualitative weather assessments in forecasting. In order to have a significant impact, hot or wet weather implies values greater than +1, cold or dry weather implies a value less than -1, while scores near zero imply

Table B-1 -- Corn yield equations: Estimated weather and trend coefficients 1/ from 1950-88

| Factor/State | Iowa | Illinois | Central Plains | Minnesota | Indiana | Ohio |
|---|---|---|---|---|---|---|
| Standard error | 6.7 | 6.9 | 5.4 | 6.0 | 6.9 | 6.0 |
| Intercept | -47.0 | -46.5 | -124.0 | -52.0 | -38.5 | -67.0 |
| Trend | 2.0 | 1.8 | 2.9 | 2.0 | 1.9 | 1.6 |
| Acreage | | 2.0** | | | | 13.4 |
| May precipitation | | | | | | |
| (May prcp)$^2$ | -2.0 | -1.7** | | -1.7 | -2.3 | |
| June temperature | | | | | | |
| (June temp)(June prcp) | 5.1 | | 1.4** | 2.2 | 3.4 | |
| June precipitation | 2.0 ** | | | | | |
| (June prcp)$^2$ | | -3.0 | | | | -3.2 |
| July temperature | | | -2.0** | -2.8 | -2.1** | |
| (July temp)$^2$ | | | 1.6** | -2.5 | | |
| (July temp)(July prcp) | 5.6 | | | 4.3 | 2.7 | |
| July precipitation | 9.0 | 7.4 | 7.4 | 6.2 | 4.1 | 6.3 |
| (July prcp)$^2$ | | -2.1 | -2.8 | | | -1.1 |
| August temperature | | | | | | |
| Exp(Aug. temp) | | -2.4 | | -1.1** | -2.6 | -1.8 |
| (Aug. temp)$^2$ | | | | | | |
| (Aug. temp)(Aug. prcp) | 5.3 | | 1.5** | | | |
| August precipitation | | | | 1.6* | | |
| (Aug. prcp)$^2$ | | | | | | |
| September temperature | | -2.3 * | | | | |

1/ t-ratios of unmarked coefficients exceed 2.0 (0-5-percent chance of insignificance).
* t-ratio is between 1.7 and 2.0 (5-10-percent chance of insignificance).
** t-ratio is between 1.3 and 1.7 (10-20-percent chance of insignificance).

Table B-1 -- Corn yield equations: Estimated weather and trend coefficients 1/ from 1950-88 (continued)

| Factor/State | Missouri | Wisconsin | Dakotas | Michigan | Rest of U.S. |
|---|---|---|---|---|---|
| Standard error | 7.7 | 6.8 | 5.2 | 6.1 | 4.7 |
| Intercept | -47.7 | -31.4 | -57.0 | -31.7 | -76.1 |
| Trend | 1.8 | 2.0 | 1.4 | 1.6 | 2.0 |
| Acreage | | -6.5** | 3.2** | | |
| May precipitation | 3.9 | | | | |
| (May prcp)$^2$ | -3.1 | | | -1.9 | |
| June temperature | 2.8 | | | | |
| (June temp)(June prcp) | | | 2.0 | | |
| June precipitation | | 7.1 | | 4.3 | 1.7 |
| (June prcp)$^2$ | | -2.5 | | -1.1** | -1.1** |
| July temperature | | | -2.5 | | |
| (July temp)$^2$ | | | -3.7 | | |
| (July temp)(July prcp) | | 4.0 | | | |
| July precipitation | 10.5 | 6.4 | 5.6 | 3.5 | 2.0 |
| (July prcp)$^2$ | -2.7 | -2.5 | -1.15** | | |
| August temperature | | | -3.2 | | |
| Exp(Aug. temp) | -2.6 | | | | -1.8 |
| (Aug. temp)$^2$ | | -1.8* | | | |
| (Aug. temp)(Aug. prcp) | | 3.0 | | -2.3** | |
| August precipitation | | | | 3.7 | |
| (Aug. prcp)$^2$ | | | | -1.3* | |
| September temperature | | | | | -2.0 |

1/ t-ratios of unmarked coefficients exceed 2.0 (0-5-percent chance of insignificance).
* t-ratio is between 1.7 and 2.0 (5-10-percent chance of insignificance).
** t-ratio is between 1.3 and 1.7 (10-20-percent chance of insignificance).

average weather. A value larger than +1 would occur about 1 year in 6, while a value larger than +2 would occur only about once in 40 years.

The coefficients of significant factors affecting corn yields in major producing States, and the regression standard errors, are presented in table B-1. Besides weather factors, two other variables (trend and acreage) are included in the model. For all States, a trend variable attempts to capture the systematic effect of technology, while in a few States corn yield correlates with planted acreage as well. The trend variable (which equals 50 in 1950 and 91 in 1991) increases yield about 2 bushels per year, ranging between 1.4 and 2.9 bushels/year. Overall, the residual variation for other factors to explain measures, on average, about 6 bushels per acre.

Because weather is a random variable, forecasting corn yield in the preseason differs from forecasting during the growing season. In the preseason, the expected weather effect is used, while in the growing season the realized values of the weather variables are used in the equations. In every State, the preseason expected value is zero for the linear weather terms, +1 for the squared weather terms, and +1.649 (that is, exp(.5)) for the exponential function of August temperature (table B-2). The preseason expected value of the interaction between temperature and precipitation differs by State and month and is the correlation between temperature and rainfall (-0.3 is a typical value).

The Missouri equation can be used to illustrate the forecasting process. The trend and intercept combine to produce a value of 116.1 bushels/acre for 1991. The preseason expected weather effect totals -10.1 (= -3.1 -2.7 -2.6 times (1.649) ) bushels/acre. The expected weather effect is negative, because bad weather reduces yield much more than good weather improves it. Thus, the preseason forecast is 106 bushels/acre, reflecting the expected weather effect. In the unlikely event that each weather variable is perfectly average, a yield of 113.5 bushels/acre would be forecast.

To illustrate the process during the growing season, suppose the following (hypothetical) weather occurred in Missouri: May was wet (+1), June was cool (-1), July was very wet (+2), and August was moderately hot (+1.5). The weather component of the Missouri yield forecast totals -3.5 bushels, reflecting +0.8 from May, -2.8 from June, +10.2 from July, and -11.7 from August. Consequently, the yield forecast is 112.6 bushels/acre given the supposed weather.

If the weather in each month were on the other side of normal than originally supposed, the weather component would total -36.5 bushels, reflecting -6.9 from May, +2.8 from June, -31.8 from July, and -0.6 from August. In this case, the yield forecast is 79.6 bushels/acre. An indication of actual 1991 weather and the corresponding yield is discussed later.

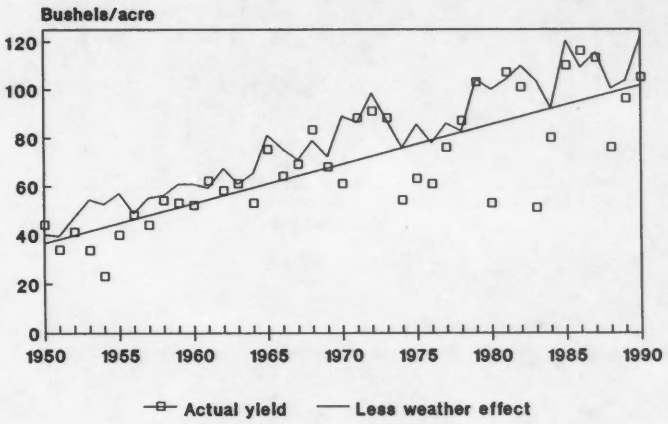
Note that equal but opposite weather variations produce quite unequal yield effects. The first case produced a 6.6-bushels/acre improvement over the preseason expected yield, while the second produced a 26.4-bushel/acre reduction. Clearly, the yield outlook depends heavily on the outcome of weather events.

Weather's effect on Missouri corn yields during the last 40 years has been substantial (figures B-2 and B-3). In the

Figure B-2

## Missouri Corn Yield

### Trend after Removing Weather Effects




### Weather Effects on Corn Yield

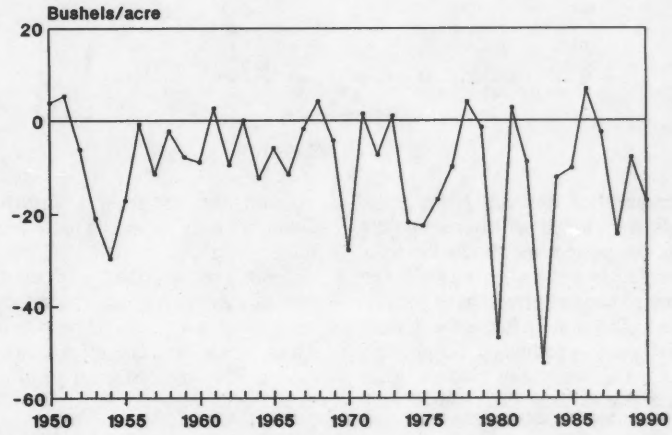
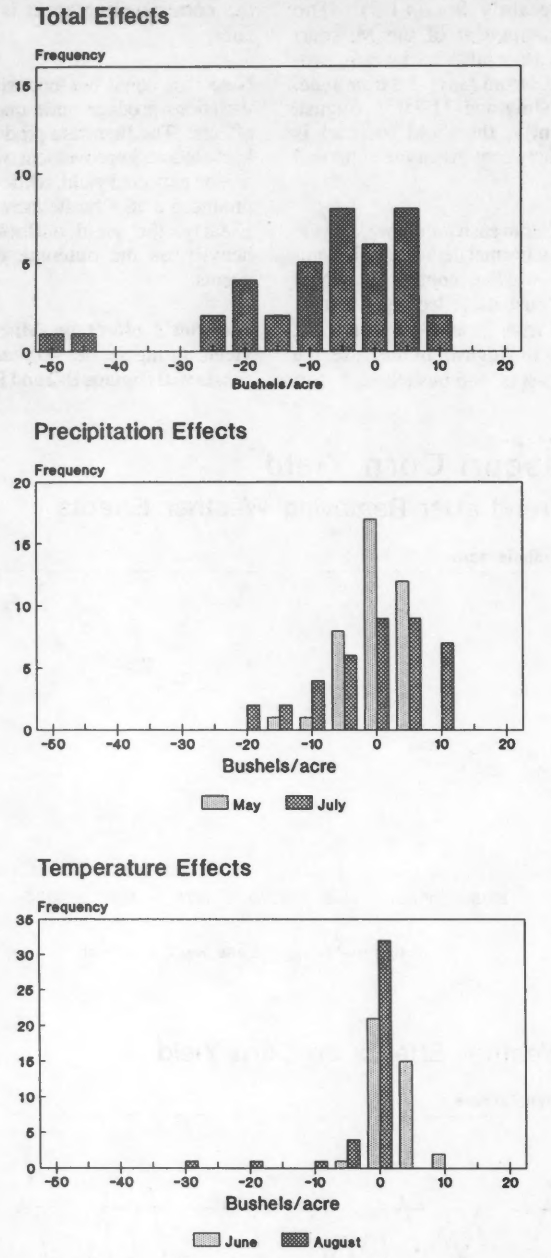


Figure B-3
Weather Effects on Missouri Corn Yield




upper panel of figure B-2, the actual yields are plotted as discrete points, while the jagged line shows the trend and residual variation in corn yield after estimated weather effects have been removed. The straight line is the trend in actual yield, unadjusted for drought years. The variability evident in the jagged line reflects the residual error around the estimated equation. Gallagher calls his analog to the jagged line a "yield capacity function" (2). The difference between the "yield capacity" and the "yield trend" is the weather effect, which averages -10 bushels/acre. Thus, when weather effects are removed from the historical yield data, trend yields improve.

The exact distribution of the total weather effect is the convolution of the distributions for each month (figure B-3). In Missouri, it is the convolution of a normal, a lognormal, and two Chi-square distributions (table B-2). Since the form of this convolution differs from that of its components, it is not surprising that Day rejected both the lognormal and the normal distributions as pure forms to represent the distributions of crop yields (1). Gallagher used a Gamma distribution to model these effects (2).

## Evaluating the Model

When a model accurately describes events outside its period of fit, its credibility rises. This process often is called "forecast evaluation," and provides a caveat to potential users of the model. Unless clear alternatives to the model exist, it should be judged as satisfactory in the interim, but used with discretion. [Don't discard the baby with the bathwater.]

The evaluation of yield predictions for 1989 and 1990 can help validate the model. If yield predictions using actual weather differ from the realized yield by less than a specified tolerance, the model is probably valid. A statistical tolerance combines standard error of the forecast and a desired level of confidence in the model.

The forecast errors and the errors normalized by the regression standard error in 1989 and 1990 for each of the States are presented in table B-3. When the normalized errors are less than 2 in absolute value, the equations are satisfactory. Because the critical value from the t-distribution is near 2 and the normalized error is slightly larger than the t-statistic on the forecasting error, ratios less than 2 reflect satisfactory forecasts. Larger errors raise concern about the structure of the model. A positive definite quadratic form must be evaluated to set the precise bounds for unsatisfactory performance (3, p.375), but ratios exceeding 3 are clearly unsatisfactory.

The yield equations' forecasting performance is satisfactory in both years in six areas (Indiana, Wisconsin, Missouri, the Dakotas, and Michigan). In the other five areas (Iowa, Illinois, Central Plains, Minnesota, and Ohio), an unsat-

Table B-2 -- Mean and variance of weather effect on crop yield 1/

| Form of weather effect | Name of distribution | Mean of weather effect | Variance of weather effect |
|---|---|---|---|
| $a + b Z$ | Normal | $a + b \mu$ | $b^2 \sigma^2$ |
| $\exp( Z )$ | Lognormal | $\exp(\mu + .5 \sigma^2)$ | $\exp(2\mu + \sigma^2)[\exp( \sigma^2 ) - 1]$ |
| $Z^2$ | Noncentral Chi-Square (1 d. f.) | $\sigma^2 + \mu^2$ | $\sigma^2 ( 2 \sigma^2 + 4 \mu^2 )$ |
| $a Z + b Z^2$ | Noncentral Chi-Square (1 d. f.) | $a \mu + b(\mu^2 + \sigma^2)$ | $\sigma^2 [2 b^2 \sigma^2 + (a + 2 b \mu)^2 ]$ |

1/ When weather (Z) is distributed as a $N(\mu, \sigma^2)$ random variable.

Source: Scheffe (5).

Table B-3 -- Corn yield equations: Prediction evaluation, 1989, 1990

| State | Predicted minus actual yield (bushels/acre) | | Normalized prediction error 1/ (Relative to regr. std. error) | |
|---|---|---|---|---|
| | 1989 | 1990 | 1989 | 1990 |
| Iowa | +6.9 | +20.0 | +1.0 | +3.0 |
| Illinois | +8.3 | -17.4 | +1.2 | -2.5 |
| Central Plains 2/ | +7.8 | +11.9 | +1.4 | +2.2 |
| Minnesota | -13.2 | +5.9 | -2.2 | +1.0 |
| Indiana | -3.4 | -10.4 | -0.5 | -1.5 |
| Ohio | -5.1 | +12.7 | -0.8 | +2.1 |
| Wisconsin | -0.8 | +4.7 | -0.1 | +0.7 |
| Missouri | +8.5 | -7.8 | +1.1 | -1.0 |
| Dakotas 3/ | +3.3 | +3.8 | +0.6 | +0.7 |
| Michigan | -8.2 | -5.5 | -1.3 | -0.9 |
| Rest of the U.S. | -5.0 | +1.6 | -1.1 | +0.3 |

1/ Compare with $t_{d.f.}(\alpha) * \sqrt{[1 + 1/n + (x_f-\mu)'(\underline{X}'\underline{X})^{-1}(x_f-\mu)]}$, satisfactory when less than 2 in absolute value.

2/ Nebraska, Kansas, and Colorado.

3/ South Dakota and North Dakota.

isfactory error occurs in one of the years. For these areas, a cause of the forecasting error is investigated. In some cases, unusual weather caused the forecast error. In others, the equation may be too responsive. For the rest of the United States as a category, the forecasting performance is satisfactory.

In Illinois and Indiana, the May precipitation response may be too great. In 1990, extreme wetness (3 standard deviations ($\sigma$) in Illinois and 2.6 $\sigma$ in Indi-

ana) evoked a yield response of -15.5 bushels. Because weather is seldom this extreme, the response is outside the range of observed historical patterns. Shading the coefficient of (May prcp)$^2$ toward zero would ameliorate this problem. Refitting the equation to include the 1990 data would scale back this coefficient.

In Iowa, June and July were wet in 1990. The yield equation for Iowa estimated each month's effect to be nearly 8 bushels. This suggests that the coefficients on precipitation (2.0 and 9.0 for June and July, respectively) may be too large.

The July temperature response in Minnesota and the Central Plains may be excessive. Considering the interaction effects, the 1.2 $\sigma$ heat in 1989 evoked a response of -12.5 bushels/acre in Minnesota. In 1990, the -0.9 $\sigma$ cool spell in the Central Plains raised yield 5.4 bushels/acre. Perhaps the (unexpectedly) positive coefficient on (July temp)$^2$ caused part of this deviation—the weather response for every other State is a concave function.

In Ohio, the July 1990 rainfall (+2.2 $\sigma$) evoked a response of 8.4 bushels/acre. Moreover, the positive acreage adjuster is counter to most analysts' expectations.

The above discussion of the model's validity suggests that, if weather events in these months are extreme relative to the historical context, the model results in these States may need some adjustment. When weather outcomes are less extreme, the model appears to forecast satisfactorily. As indicated above, the other six States' forecasts were quite satisfactory, despite some modest anomalies in the weather. Refitting the model using data through 1990 is an alternative to adjusting the equations that did not forecast well in 1989 or 1990. However, that would not allow an out-of-sample validation of the model.

## Scenarios of Climate Change

What would happen to U.S. corn yields if climate were to change? The equations in table B-1 provide some insight into the potential effect of climatic change. To understand the analysis it is necessary to distinguish between weather and climate. Weather is the realization of a random variable. Climate is the distribution that generates that random variable. Different draws from the same distribution generate different weather, but one would expect the weather's average and variation to be stable over time. If the climate changes, weather is drawn from a different distribution that may have a different average and/or variance. In the absence of catastrophic events, detecting definitive climatic change requires decades or centuries of data (4, p. 114).

Weather data over the last 60 years provide some, but not much, evidence of climatic change (figure B-1). Because climatic change may affect both the level and variability of weather outcomes, both mean and variance are examined. In the 1930's and 1940's, the average August temperature was about 1 degree warmer and July rainfall 0.75 inch less than the average for the last 40 years. These differences are about half the standardized units used here—about as small a difference as is statistically significant. The Missouri yield equation indicates that those climatic differences would reduce corn yield by about 7.35 bushels/acre.[1]

The precipitation variance is uniform over the 60 years, excluding 1958. Temperature variation in the 1930's and 1940's exceeded that in the 1950's and 1960's and was about the same as in the 1970's and 1980's. The only significant difference in variance is in the comparison of temperature variance between 1931-50 and 1951-70.

Two scenarios of climate change simulate the potential impact on corn yields before technology and management practices adapt to the new climate. In the first case, weather is more variable, but remains centered on historically average temperatures and rainfall (table B-4). In the second case, not only is weather more variable, but the average temperature is hotter and the average rainfall is less than in the past. The two scenarios are compared with a base case in which the temperature and precipitation variables came from a standard normal distribution.[2]

[1] Missouri's yield averaged only 27.9 bushels/acre during 1930-50.

Greater weather variability reduces average corn yields (figure B-4) regardless of average rainfall or temperature, since the nonlinear response translates greater weather variability into lower average yield. Of course, more-variable weather raises yield variability as well. If the variance of every weather variable is twice the historical variance, State average corn yields fall 2 to 10 bushels/acre. In addition, the variance of corn yield more than doubles and confidence limits on yield estimates are half again as long. This scenario, with 1991 acreages, would reduce U.S. corn production by 400 million bushels and reduce the U.S. average yield by 5.7 bushels.

If the second case develops and the weather becomes hotter, drier, and more variable, the estimated weather effect in this model is disastrous. Estimated average corn yields fall 20-50 bushels/acre. Confidence limits on yield estimates are 3 to 4 times as long, since the variance is up to 16 times the original variance. With 1991 acreages, this scenario reduces total corn production by 1.9 billion bushels and drops the U.S. average yield 28.3 bushels/acre.

It is important to understand the relative change in climate that generates such changes in crop yields. The units in the simulated changes are not large. For monthly average rainfall, each standard deviation is only 1 to 1.5 inches, and for temperature, only 2 to 2.5 degrees Fahrenheit. The variance, which is the square of this measure, is the quantity that is doubled, while the average temperature and rainfall are shifted by only one standard deviation. The likelihood of such changes under a "global climate change" scenario is debatable, but their potential effect is great enough to arouse concern.

[2] The results in table B-4 were calculated from the coefficients in table B-1 and distributions in table B-2, assuming that weather components are independent, normally distributed random variables. Where temperature and precipitation interact, an axis rotation eliminated the cross-product terms before the weather distribution was derived.

## Weather and the 1991 Crop

A preseason analysis of the 1991 crop is given in table B-5. The preseason forecast for Iowa is a corn yield between 118 and 143 bushels with 2-to-1 odds. The

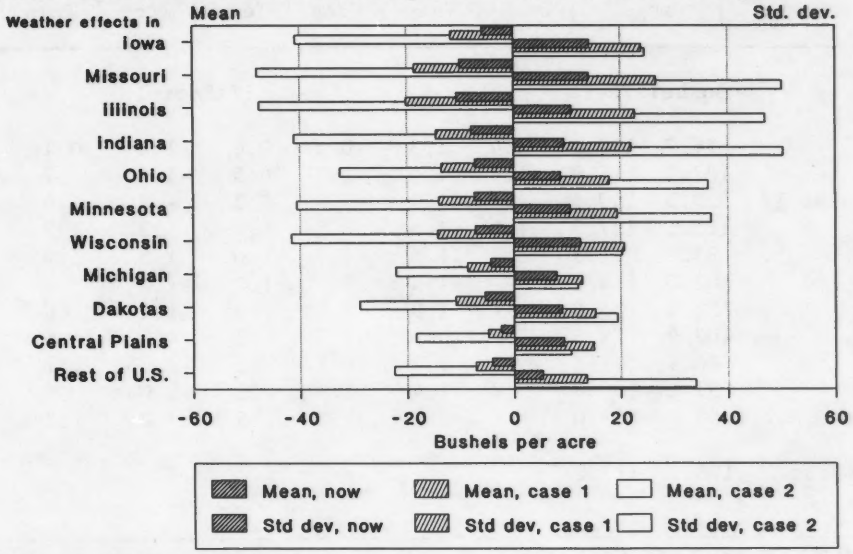
Table B-4 -- Weather's effect on corn yield using assumed climate changes

| State | Base climatic scenario 1/ 2/ | | More variable climate 3/ 2/ | | Hotter, drier, and more variable climate 4/ 2/ | |
|---|---|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| | - - - - - - - - - - - - (Bushels/acre) - - - - - - - - | | | | | |
| Iowa | -5.83 | 14.19 | -11.67 | 23.88 | -40.82 | 24.57 |
| Illinois | -10.73 | 10.88 | -20.09 | 22.69 | -47.67 | 47.02 |
| Central Plains 5/ | -2.44 | 9.32 | -4.87 | 14.91 | -18.37 | 10.71 |
| Minnesota | -7.34 | 10.51 | -14.04 | 19.37 | -40.63 | 36.92 |
| Indiana | -8.00 | 9.45 | -14.51 | 22.01 | -41.13 | 50.28 |
| Ohio | -7.27 | 8.83 | -13.50 | 17.96 | -32.51 | 36.32 |
| Wisconsin | -7.12 | 12.50 | -14.23 | 20.70 | -41.64 | 20.25 |
| Missouri | -10.06 | 14.06 | -18.63 | 26.69 | -48.01 | 50.08 |
| Dakotas 6/ | -5.43 | 9.09 | -10.85 | 15.22 | -28.93 | 19.33 |
| Michigan | -4.36 | 7.99 | -8.71 | 12.80 | -22.16 | 12.02 |
| Rest of the U.S. | -4.10 | 5.36 | -7.15 | 13.60 | -22.44 | 33.98 |

1/ Standardized weather drawn from N(0, 1) distribution.
2/ Each unit averages 1 to 1.5 inches of rain or 2 to 2.5 degrees Fahrenheit per month.
3/ Standardized weather drawn from N(0, 2) distribution.
4/ Standardized weather drawn from N(1, 2) distribution.
5/ Nebraska, Kansas, and Colorado.
6/ South Dakota and North Dakota.

Figure B-4

## Corn Yield Falls and Variability Rises if Climate Changes




Assumed climatic changes--
Case 1: Same mean, but more variable
Case 2: Hotter, drier, and more variable

Table B-5 -- Corn yield: Trend and variability in selected States, 1950-88

| State | "Trend yield" estimate for 1991 | Components of variability: Std. error around simple time trend | Components of variability: Std. error around trend with weather | Components of variability: Weather-related variation |
|---|---|---|---|---|
| | (Bushels/acre) | | | |
| Iowa | 130.6 | 12.5 | 6.7 | 10.6 |
| Illinois | 131.1 | 14.7 | 6.9 | 13.0 |
| Central Plains 1/ | 139.4 | 9.1 | 5.4 | 7.3 |
| Minnesota | 116.6 | 12.2 | 6.0 | 10.6 |
| Indiana | 125.9 | 12.4 | 6.9 | 10.3 |
| Ohio | 122.6 | 10.1 | 6.0 | 8.1 |
| Wisconsin | 113.5 | 10.9 | 6.8 | 8.6 |
| Missouri | 103.7 | 15.0 | 7.7 | 12.8 |
| Dakotas 2/ | 76.5 | 9.7 | 5.2 | 8.2 |
| Michigan | 103.9 | 8.3 | 6.1 | 5.6 |
| Rest of the U.S. | 102.6 | 7.7 | 4.7 | 6.2 |
| Weighted average | 121.0 | 4.2 3/ | 2.2 3/ | NA |
| U.S. average | 121.7 | 9.2 | NA | NA |

1/ Nebraska, Kansas, and Colorado.
2/ South Dakota and North Dakota.
3/ Standard error of weighted average.
NA = Not available.

Table B-6 -- Estimated 1991 corn yield: Based on indicated weather through August

| State | Yield forecast range | | Qualitative weather assessment: May Prcp | June Temp | June Prcp | July Temp | July Prcp | August Temp | August Prcp |
|---|---|---|---|---|---|---|---|---|---|
| | Bushels/acre | | (Z-Score) | | | | | | |
| Iowa | 96.7 | 110.1 | 1.4 | 1.3 | -0.5 | 0.0 | -1.6 | 0.1 | -0.6 |
| Illinois | 102.1 | 115.9 | 1.3 | 1.4 | -1.7 | 0.5 | -1.6 | .7 | - .7 |
| Central Plains 1/ | 129.3 | 140.1 | --- | 1.2 | .2 | 0.2 | -.8 | .6 | -1.3 |
| Minnesota | 115.5 | 127.5 | 1.3 | 1.5 | .5 | -.4 | .3 | 1.2 | -1.5 |
| Indiana | 97.9 | 111.7 | 1.3 | 1.5 | -1.7 | 1.0 | -1.5 | 1.0 | - .3 |
| Ohio | 102.0 | 114.0 | --- | 1.4 | -1.5 | 1.4 | -1.3 | .8 | - .9 |
| Wisconsin | 122.2 | 135.8 | --- | 1.8 | -.5 | .5 | 1.1 | .8 | - .6 |
| Missouri | 102.9 | 118.3 | 1.2 | .8 | -1.7 | .3 | -.2 | .6 | - .9 |
| Dakotas 2/ | 66.9 | 77.3 | --- | 1.3 | .5 | .1 | -1.3 | 1.1 | -1.7 |
| Michigan | 97.6 | 109.8 | .9 | 1.4 | -1.3 | .5 | 1.0 | .9 | - .2 |
| Rest of the U.S. | 99.6 | 109.0 | --- | .5 | -.5 | 1.5 | .2 | .2 | -1.0 |
| Weighted average | 108.2 | 113.2 | | | | | | | |

1/ Nebraska, Kansas, and Colorado.
2/ South Dakota and North Dakota.
--- = Not used in estimates.

weighted average of State yields implies a U.S. average between 117 and 125 bushels/acre. When the national yield trend alone is used, the estimate is between 112 and 131 bushels/acre (less precision with the same confidence).

The "trend yield" estimates reflect the 39 years of data, unadjusted for any weather effect. "Trend yield" estimates do not differ significantly from the preseason expectations using table B-1. There is no practical difference between the 103.7 bushel Missouri yield tabulated here and the 106.0 bushel preseason expectation derived earlier. As weather data become available, more precise estimates are possible. When August weather is known, the interval yield estimate is nearly half its preseason length.

Based on harvested acreage indicated by NASS in its June *Acreage* report, U.S. corn production is estimated at 7.5 to 7.9 billion bushels using weather through August. So far, the weather has reduced corn yield prospects (table B-6). Michigan, Minnesota and Wisconsin had favorable rainfall during July and August. In the Corn Belt heavy May rains were followed by dry weather in June and July, and these months have been warmer than average. This weather drops the Iowa forecast to 96-110 bushels. The U.S. forecast ranges between 108 and 114 bushels, given the indicated weather.

## References


1. Day, R.H. "Probability Distributions of Field Crop Yields," Journal of Farm Economics, Vol. 47, No. 3, August 1965, pp. 713-41.

2. Gallagher, P. "U.S. Corn Yield Capacity and Probability: Estimation and Forecasting with Nonsymmetric Disturbances," North Central Journal of Agricultural Economics, Vol. 8, 1986, pp. 109-22.

3. Kmenta, J. Elements of Econometrics, New York: The Macmillan Company, 1971.

4. National Defense University, and others. Crop Yields and Climate Change to the Year 2000, Volume I, Fort Lesley J. McNair, Washington, DC, 1980, 128 pages.

5. Scheffe, H. The Analysis of Variance, New York: John Wiley & Sons, 1959, pp.412-5.

6. Teigen, L.D. and F. Singer. Weather in U.S. Agriculture: Monthly Temperature and Precipitation by State and Farm Production Region, 1950-88, Stat. Bulletin No. 789, Econ. Res. Serv., U.S. Dept. of Agriculture, November 1989.

7. Thompson, L.M. "Climate Change, Weather Variability, and Corn Production," Agronomy Journal, Vol. 78, July-August 1986, pp. 649-53.


### Data Product Availability

The equations forecasting regional and national corn yield and production described here are available as a LOTUS 1-2-3 spreadsheet model on one 5.25 inch, 360kb diskette. This model also includes similar relationships for soybeans and corn yield equations, not discussed here, which are conditioned on fertilizer application rates. The model computes corn and soybean production, assuming planted acreage, the weather scenario, and fertilizer application on corn to be exogenous. For further information, contact Lloyd D. Teigen (202) 219-0706.

To order the model, request "Weather in U.S. Corn and Soybean Production," order number 92001, $25, from ERS-NASS, Post Office Box 1608, Rockville, MD 20849-1608, or call 1-800-999-6779.

Appendix table 1--Feed grains: Marketing year supply and disappearance, area

| Year 2/ | Supply | | | | Do | |
|---|---|---|---|---|---|---|
| | Beginning stocks | Production | Imports | Total | Food, alcohol, and industrial | |
| | | | | | | Mi |
| 1984/85 | 39.6 | 236.8 | 0.7 | 277.1 | 31.4 | |
| 1985/86 | 57.5 | 274.3 | 0.8 | 332.5 | 33.5 | |
| 1986/87 | 126.4 | 251.6 | 0.7 | 378.7 | 34.2 | |
| 1987/88 | 152.1 | 216.5 | 1.0 | 369.6 | 35.6 | |
| 1988/89 | 133.6 | 149.3 | 1.2 | 284.2 | 36.5 | |
| 1989/90 | 65.9 | 221.0 | 1.3 | 288.2 | 37.6 | |
| 1990/91 4/ | 45.5 | 230.4 | 1.5 | 277.4 | 38.6 | |
| 1991/92 5/ | 47.7 | 218.5 | 1.4 | 267.6 | ---40.3--- | |

| | Area | | |
|---|---|---|---|
| | Set-aside and diverted | Planted | Harvested for grain |
| | Million hectares | | |
| 1984/85 | 2.1 | 49.5 | 43.2 |
| 1985/86 | 2.9 | 51.8 | 45.2 |
| 1986/87 | 7.3 | 48.5 | 41.1 |
| 1987/88 | 12.5 | 43.1 | 35.2 |
| 1988/89 | 11.1 | 41.2 | 32.6 |
| 1989/90 | 6.8 | 42.9 | 36.9 |
| 1990/91 | 7.0 | 41.8 | 36.2 |
| 1991/92 | 5.0 | 42.3 | 37.1 |

1/ Aggregated data on corn, sorghum, barley, and oats. 2/ The marketing y
barley, June 1. 3/ Includes total Government loans (original and reseal).
7/ Deficiency payments. 8/ Deficiency and diversion payments.

area, and prices, 1984/85-1991/92 1/

| Disappearance | | | | | Ending stocks | | |
|---|---|---|---|---|---|---|---|
| Domestic use | | | Exports | Total disappearance | Govt. owned | Privately owned 3/ | Total |
| Seed | Feed and residual | Total | | | | | |
| Million metric tons | | | | | | | |
| 1.5 | 130.6 | 163.5 | 56.1 | 219.6 | 8.9 | 48.6 | 57.5 |
| 1.5 | 135.1 | 170.0 | 36.1 | 206.2 | 20.4 | 106.0 | 126.4 |
| 1.4 | 145.1 | 180.7 | 45.9 | 226.6 | 48.7 | 103.4 | 152.1 |
| 1.3 | 146.9 | 183.7 | 52.3 | 236.0 | 34.1 | 99.5 | 133.6 |
| 1.2 | 119.4 | 157.1 | 61.1 | 218.3 | 18.6 | 47.3 | 65.9 |
| 1.1 | 134.3 | 173.0 | 69.7 | 242.7 | 10.5 | 35.0 | 45.5 |
| 1.1 | 138.4 | 178.1 | 51.5 | 229.7 | 11.3 | 36.4 | 47.7 |
| .3--- | 140.1 | 180.4 | 46.9 | 227.3 | 0.8 | 39.5 | 40.3 |

| sted r in | Yield per harvested hectare | Index Average price received by farmers 6/ | Government-support program Total payments to participants |
|---|---|---|---|
| - | Metric tons | 1977=100 | $ million |
| 2 | 5.48 | 130 | 7/ 1,860 |
| 2 | 6.07 | 110 | 7/ 2,785 |
| 1 | 6.12 | 74 | 8/ 7,343 |
| 2 | 6.15 | 96 | 8/ 8,461 |
| 6 | 4.58 | 126 | 8/ 3,157 |
| 9 | 5.99 | 118 | 7/ 3,918 |
| 2 | 6.36 | 114 | 7/ 3,403 |
| 1 | 5.82 | | |

ing year for corn and sorghum begins September 1; for oats and l). 4/ Preliminary. 5/ Projected. 6/ Excludes support payments.

Appendix table 2--Foreign coarse grains: Supply and disappearance, 1980/81-1991/92 1/

| Year | Beginning stocks | Production | Feed | Total Disappearance | Imports | Adjusted imports 2/ | Ending stocks |
|---|---|---|---|---|---|---|---|
| | | | Million metric tons | | | | |
| **Corn:** | | | | | | | |
| 1980/81 | 45.8 | 240.1 | 168.4 | 297.7 | 79.1 | 78.1 | 48.9 |
| 1981/82 | 48.9 | 235.1 | 175.9 | 291.0 | 77.6 | 67.3 | 43.8 |
| 1982/83 | 43.8 | 230.3 | 174.3 | 281.3 | 73.2 | 63.3 | 39.1 |
| 1983/84 | 39.1 | 241.6 | 167.7 | 288.6 | 64.9 | 61.1 | 39.8 |
| 1984/85 | 39.8 | 263.9 | 183.6 | 303.3 | 72.5 | 66.6 | 47.4 |
| 1985/86 | 47.4 | 254.0 | 185.7 | 291.0 | 62.1 | 54.3 | 41.2 |
| 1986/87 | 41.2 | 265.5 | 193.2 | 307.4 | 61.1 | 56.6 | 37.2 |
| 1987/88 | 37.2 | 269.0 | 196.3 | 311.3 | 62.8 | 56.7 | 38.4 |
| 1988/89 | 38.4 | 275.8 | 211.6 | 325.9 | 73.4 | 63.8 | 39.7 |
| 1989/90 | 39.7 | 271.3 | 217.1 | 334.2 | 80.3 | 73.2 | 37.0 |
| 1990/91 3/ | 37.0 | 277.7 | 196.2 | 315.9 | 61.3 | 57.2 | 42.6 |
| 1991/92 4/ | 42.6 | 288.2 | 204.9 | 323.6 | 61.0 | 55.6 | 47.1 |
| **Sorghum:** | | | | | | | |
| 1980/81 | 6.9 | 44.6 | 23.3 | 50.8 | 12.8 | 14.1 | 8.1 |
| 1981/82 | 8.1 | 48.2 | 28.5 | 55.5 | 14.3 | 13.7 | 7.4 |
| 1982/83 | 7.4 | 44.0 | 25.2 | 50.6 | 12.3 | 11.6 | 6.1 |
| 1983/84 | 6.1 | 46.1 | 25.7 | 52.0 | 13.1 | 13.0 | 6.5 |
| 1984/85 | 6.5 | 43.8 | 26.1 | 51.8 | 12.9 | 13.1 | 6.0 |
| 1985/86 | 6.0 | 41.7 | 24.9 | 47.3 | 9.6 | 8.8 | 5.0 |
| 1986/87 | 5.0 | 40.5 | 23.3 | 46.3 | 8.1 | 7.8 | 4.2 |
| 1987/88 | 4.2 | 37.8 | 22.7 | 44.8 | 8.7 | 8.3 | 3.1 |
| 1988/89 | 3.1 | 39.7 | 24.1 | 46.4 | 10.9 | 10.8 | 4.3 |
| 1989/90 | 4.3 | 39.4 | 22.0 | 47.2 | 9.3 | 8.9 | 4.2 |
| 1990/91 3/ | 4.2 | 38.5 | 21.2 | 44.5 | 8.0 | 7.5 | 4.1 |
| 1991/92 4/ | 4.1 | 38.3 | 21.1 | 44.5 | 7.4 | 7.3 | 3.0 |
| **Barley:** | | | | | | | |
| 1980/81 | 16.9 | 155.6 | 107.5 | 156.9 | 16.3 | 13.8 | 17.1 |
| 1981/82 | 17.1 | 145.1 | 105.6 | 149.8 | 20.4 | 13.9 | 14.4 |
| 1982/83 | 14.4 | 156.1 | 108.1 | 153.4 | 17.1 | 13.1 | 17.9 |
| 1983/84 | 17.9 | 154.2 | 115.5 | 161.0 | 20.3 | 16.4 | 12.9 |
| 1984/85 | 12.9 | 163.7 | 116.2 | 158.9 | 23.1 | 17.9 | 19.1 |
| 1985/86 | 19.1 | 166.2 | 120.7 | 162.9 | 22.1 | 18.2 | 22.6 |
| 1986/87 | 22.6 | 170.2 | 125.4 | 168.9 | 24.0 | 18.4 | 26.7 |
| 1987/88 | 26.7 | 169.9 | 127.2 | 173.8 | 20.6 | 15.7 | 25.2 |
| 1988/89 | 25.2 | 162.4 | 118.6 | 162.6 | 20.3 | 16.6 | 26.5 |
| 1989/90 | 26.5 | 161.3 | 120.1 | 165.4 | 20.1 | 15.1 | 24.0 |
| 1990/91 3/ | 24.0 | 177.3 | 127.8 | 176.6 | 21.1 | 17.5 | 26.1 |
| 1991/92 4/ | 26.1 | 160.7 | 119.2 | 164.7 | 20.7 | 18.0 | 23.6 |
| **Total coarse grains: 5/** | | | | | | | |
| 1980/81 | 77.4 | 534.5 | 342.0 | 600.4 | 110.3 | 108.1 | 81.5 |
| 1981/82 | 81.5 | 520.7 | 351.9 | 588.7 | 114.5 | 97.5 | 72.8 |
| 1982/83 | 72.8 | 534.2 | 357.2 | 586.1 | 104.0 | 89.5 | 73.2 |
| 1983/84 | 73.2 | 551.4 | 364.7 | 609.2 | 100.2 | 92.8 | 70.8 |
| 1984/85 | 70.8 | 579.0 | 377.8 | 619.3 | 111.1 | 99.7 | 85.9 |
| 1985/86 | 85.9 | 569.2 | 387.3 | 609.2 | 95.7 | 82.3 | 81.2 |
| 1986/87 | 81.2 | 580.9 | 394.6 | 625.9 | 95.1 | 83.0 | 81.4 |
| 1987/88 | 81.4 | 578.2 | 398.3 | 631.3 | 94.0 | 81.9 | 79.5 |
| 1988/89 | 79.5 | 581.6 | 403.1 | 638.0 | 106.3 | 92.7 | 83.1 |
| 1989/90 | 83.1 | 581.3 | 414.1 | 654.6 | 111.8 | 98.6 | 78.3 |
| 1990/91 3/ | 78.3 | 603.4 | 399.9 | 644.1 | 92.0 | 83.4 | 87.5 |
| 1991/92 4/ | 87.5 | 582.8 | 392.2 | 628.0 | 90.9 | 81.8 | 87.8 |

1/ Aggregated on basis of local marketing years, except for adjusted imports. 2/ Based on Oct./Sept. trade year and excludes intra-EC trade. 3/ Preliminary. 4/ Forecast. 5/ Includes oats, rye, millet, and mixed grains.

Source: Compiled from World Grain Situation and Outlook, Foreign Agricultural Service, and USDA data.

Appendix table 3--Corn: Marketing year supply and disappearance, area, and pr

| Year beginning September 1 | Supply | | | | Dome | |
|---|---|---|---|---|---|---|
| | Begin-ning stocks | Produc-tion | Imports | Total | Food, alcohol, and industrial | Se |
| | | | | | Mil | |
| 1984/85 | 1,006.3 | 7,672.1 | 1.7 | 8,680.1 | 1,070.0 | 2 |
| 1985/86 | 1,648.2 | 8,875.5 | 10.0 | 10,533.7 | 1,140.0 | 1 |
| 1986/87 | 4,039.5 | 8,225.8 | 1.7 | 12,267.0 | 1,175.0 | 1 |
| 1987/88 | 4,881.7 | 7,131.3 | 3.4 | 12,016.4 | 1,212.0 | 1 |
| 1988/89 | 4,259.1 | 4,928.7 | 2.8 | 9,190.6 | 1,232.4 | 1 |
| 1989/90 | 1,930.4 | 7,525.5 | 1.9 | 9,457.8 | 1,271.0 | 1 |
| 1990/91 2/ | 1,344.5 | 7,933.1 | 3.9 | 9,281.4 | 1,305.7 | 1 |
| 1991/92 3/ | 1,520.9 | 7,485.9 | 2.0 | 9,008.8 | ---1,350.0--- | |

| | Area | | | Yield per harvested acre | |
|---|---|---|---|---|---|
| | Set-aside and diverted | Planted | Harvested for grain | | Received by farmers 4 |
| | Million acres | | | Bushels | |
| 1984/85 | 3.9 | 80.5 | 71.9 | 106.7 | 2.63 |
| 1985/86 | 5.4 | 83.4 | 75.2 | 118.0 | 2.23 |
| 1986/87 | 14.3 | 76.6 | 68.9 | 119.4 | 1.50 |
| 1987/88 | 23.1 | 66.2 | 59.5 | 119.8 | 1.94 |
| 1988/89 | 20.5 | 67.7 | 58.3 | 84.6 | 2.54 |
| 1989/90 | 10.8 | 72.2 | 64.7 | 116.3 | 2.36 |
| 1990/91 | 10.7 | 74.2 | 67.0 | 118.5 | 2.28 |
| 1991/92 | 7.4 | 75.9 | 68.7 | 108.9 | 2.15-2.55 |

1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary.
6/ Deficiency and diversion payments. 7/ Deficiency, diversion, and disaster

nd prices, 1984/85-1991/92

| Disappearance | | | | | Ending stocks Aug. 31 | | |
|---|---|---|---|---|---|---|---|
| -Domestic use- | | | | | | | |
| Seed | Feed and residual | Total | Exports | Total disappearance | Govt. owned | Privately owned 1/ | Total |
| Million bushels | | | | | | | |
| 21.2 | 4,090.5 | 5,181.7 | 1,850.2 | 7,031.9 | 224.9 | 1,423.3 | 1,648.2 |
| 19.5 | 4,107.4 | 5,266.9 | 1,227.3 | 6,494.2 | 545.7 | 3,493.8 | 4,039.5 |
| 16.7 | 4,701.2 | 5,892.9 | 1,492.4 | 7,385.3 | 1,443.2 | 3,438.5 | 4,881.7 |
| 17.2 | 4,811.7 | 6,040.9 | 1,716.4 | 7,757.3 | 835.0 | 3,424.1 | 4,259.1 |
| 18.4 | 3,981.0 | 5,231.8 | 2,028.4 | 7,260.2 | 362.5 | 1,567.9 | 1,930.4 |
| 18.9 | 4,454.7 | 5,744.6 | 2,368.8 | 8,113.4 | 233.0 | 1,111.5 | 1,344.5 |
| 19.3 | 4,708.9 | 6,033.9 | 1,726.6 | 7,760.6 | 371.1 | 1,149.8 | 1,520.9 |
| .0--- | 4,800.0 | 6,150.0 | 1,575.0 | 7,725.0 | 25.0 | 1,258.8 | 1,283.8 |

| Average prices | | | | Government-support program | | |
|---|---|---|---|---|---|---|
| eived by ers 4/ | St. Louis No. 2 yellow | Omaha No. 2 yellow | Gulf Ports No. 2 yellow | National average loan rate | Target price | Total payments to participants |
| $/bu. | | | | | | $ million |
| .63 | 2.81 | 2.65 | 2.99 | 2.55 | 3.03 | 5/ 1,654 |
| .23 | 2.37 | 2.25 | 2.52 | 2.55 | 3.03 | 5/ 2,479 |
| .50 | 1.68 | 1.53 | 1.83 | 1.92 | 3.03 | 6/ 6,327 |
| .94 | 2.19 | 1.98 | 2.39 | 1.82 | 3.03 | 6/ 7,386 |
| .54 | 2.72 | 2.49 | 2.93 | 1.77 | 2.93 | 7/ 3,627 |
| .36 | 2.58 | 2.41 | 2.79 | 1.65 | 2.84 | 8/ 3,589 |
| .28 | 2.49 | 2.28 | 2.70 | 1.57 | 2.75 | 5/ 3,015 |
| -2.55 | | | | 1.62 | 2.75 | |

ary. 3/ Projected. 4/ Excludes support payments. 5/ Deficiency payments.
aster payments. 8/ Deficiency and disaster payments.

Appendix table 4--Sorghum: Marketing year supply and disappearance, area, and pric

| Year beginning September 1 | Supply | | | | Domest | |
|---|---|---|---|---|---|---|
| | Begin-ning stocks | Produc-tion | Imports | Total | Food, alcohol, and industrial | Seed |
| | | | | | Million | |
| 1984/85 | 287.4 | 866.2 | 0.1 | 1,153.7 | 15.3 | 2.0 |
| 1985/86 | 300.2 | 1,120.3 | --- | 1,420.5 | 26.0 | 1.7 |
| 1986/87 | 551.0 | 938.9 | --- | 1,489.9 | 10.4 | 1.6 |
| 1987/88 | 743.3 | 730.8 | --- | 1,474.1 | 23.5 | 1.3 |
| 1988/89 | 662.7 | 576.7 | --- | 1,239.3 | 20.5 | 1.5 |
| 1989/90 | 439.5 | 615.4 | 0.2 | 1,055.2 | 13.6 | 1.1 |
| 1990/91 2/ | 219.8 | 571.5 | 0.1 | 791.3 | 12.7 | 1.3 |
| 1991/92 3/ | 143.2 | 578.3 | 0.1 | 721.6 | ---15.0--- | |

| | Area | | | Yield per harvested acre | | Kar |
|---|---|---|---|---|---|---|
| | Set-aside and diverted | Planted | Harvested for grain | | Received by farmers 4/ | |
| | Million acres | | | Bushels | | |
| 1984/85 | 0.6 | 17.3 | 15.4 | 56.4 | 4.15 | |
| 1985/86 | 0.9 | 18.3 | 16.8 | 66.8 | 3.45 | |
| 1986/87 | 2.7 | 15.3 | 13.9 | 67.7 | 2.45 | |
| 1987/88 | 4.4 | 11.8 | 10.5 | 69.4 | 3.04 | |
| 1988/89 | 3.9 | 10.3 | 9.0 | 63.8 | 4.05 | |
| 1989/90 | 3.3 | 12.6 | 11.1 | 55.4 | 3.75 | |
| 1990/91 | 3.3 | 10.5 | 9.1 | 62.9 | 3.79 | |
| 1991/92 | 2.3 | 11.0 | 9.7 | 59.4 | 3.66-4.38 | |

--- = Not applicable.
1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary. 3/
6/ Deficiency and diversion payments. 7/ Deficiency, diversion and disaster paym

d prices, 1984/85-1991/92

| Disappearance | | | | | Ending stocks Aug. 31 | | |
|---|---|---|---|---|---|---|---|
| omestic use | | | | | | | |
| eed | Feed and residual | Total | Exports | Total disappearance | Govt. owned | Privately owned 1/ | Total |
| lion bushels | | | | | | | |
| 2.0 | 539.3 | 556.6 | 296.9 | 853.5 | 112.1 | 188.1 | 300.2 |
| 1.7 | 663.8 | 691.5 | 178.0 | 869.5 | 207.2 | 343.8 | 551.0 |
| 1.6 | 536.2 | 548.2 | 198.3 | 746.5 | 408.9 | 334.4 | 743.3 |
| 1.3 | 555.1 | 579.9 | 231.6 | 811.5 | 463.6 | 199.1 | 662.7 |
| 1.5 | 467.6 | 489.6 | 310.2 | 799.8 | 340.9 | 98.6 | 439.5 |
| 1.1 | 517.2 | 531.9 | 303.5 | 835.4 | 162.5 | 57.3 | 219.8 |
| 1.3 | 401.3 | 415.3 | 232.8 | 648.2 | 64.7 | 78.5 | 143.2 |
| | 389.6 | 404.6 | 200.0 | 604.6 | | | 117.0 |

| Average prices | | | Government-support program | | |
|---|---|---|---|---|---|
| Kansas City No. 2 yellow | Texas No. 2 yellow | Gulf Ports No. 2 yellow | National average loan rate | Target price | Total payments to participants |
| /----$/cwt.---- | | | | | $ million |
| 4.46 | 5.04 | 4.90 | 4.32 | 5.14 | 5/ 158 |
| 3.72 | 4.32 | 4.07 | 4.32 | 5.14 | 5/ 227 |
| 2.73 | 3.24 | 3.22 | 3.25 | 5.14 | 6/ 570 |
| 3.40 | 3.81 | 3.96 | 3.11 | 5.14 | 6/ 709 |
| 4.17 | 4.66 | 4.81 | 3.00 | 4.96 | 7/ 352 |
| 4.21 | 4.38 | 4.76 | 2.80 | 4.82 | 8/ 421 |
| 4.08 | 4.48 | 4.65 | 2.66 | 4.66 | 5/ 320 |
| 3 | | | 2.75 | 4.66 | |

3/ Projected. 4/ Excludes support payments. 5/ Deficiency payments.
payments. 8/ Deficiency and disaster payments.

Appendix table 5--Barley: Marketing year supply and disappearance, area, an

| Year beginning June 1 | Supply | | | | Food, alcohol, and industrial | |
|---|---|---|---|---|---|---|
| | Beginning stocks | Production | Imports | Total | | |
| | | | | | | Mi |
| 1984/85 | 189.4 | 598.0 | 7.5 | 794.9 | 149.0 | |
| 1985/86 | 247.4 | 590.2 | 6.2 | 843.8 | 147.2 | |
| 1986/87 | 327.2 | 608.5 | 6.6 | 942.3 | 156.1 | |
| 1987/88 | 336.3 | 521.5 | 11.3 | 869.1 | 158.3 | |
| 1988/89 | 321.1 | 290.0 | 10.5 | 621.6 | 164.7 | |
| 1989/90 | 196.4 | 404.2 | 13.1 | 613.7 | 165.4 | |
| 1990/91 2/ | 160.8 | 422.2 | 14.9 | 597.9 | 169.7 | |
| 1991/92 3/ | 135.4 | 464.5 | 20.0 | 619.9 | ---175.0-- | |

| | Area | | | Yield per harvested acre | Receive by farmers |
|---|---|---|---|---|---|
| | Set-aside and diverted | Planted | Harvested for grain | | |
| | ----------Million acres---------- | | | Bushels | ----- |
| 1984/85 | 0.5 | 12.0 | 11.2 | 53.4 | 2.29 |
| 1985/86 | 0.7 | 13.2 | 11.6 | 51.0 | 1.98 |
| 1986/87 | 2.0 | 13.1 | 12.0 | 50.8 | 1.61 |
| 1987/88 | 2.9 | 11.0 | 10.0 | 52.4 | 1.81 |
| 1988/89 | 2.8 | 9.8 | 7.6 | 38.0 | 2.80 |
| 1989/90 | 2.3 | 9.1 | 8.3 | 48.6 | 2.42 |
| 1990/91 | 2.9 | 8.2 | 7.5 | 56.1 | 2.14 |
| 1991/92 | 2.2 | 8.9 | 8.4 | 55.2 | 2.00-2.2 |

1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary. March 1987, shifted to Duluth. 6/ Deficiency payments. 7/ Deficiency and 9/ Deficiency and disaster payments.

a, and prices, 1984/85-1991/92

| Disappearance | | | | | Ending stocks May 31 | | |
|---|---|---|---|---|---|---|---|
| Domestic use | | | Exports | Total disappearance | Govt. owned | Privately owned 1/ | Total |
| Seed | Feed and residual | Total | | | | | |
| Million bushels | | | | | | | |
| 21.4 | 305.5 | 475.9 | 71.6 | 547.5 | 15.6 | 231.8 | 247.4 |
| 21.3 | 328.3 | 496.8 | 19.8 | 516.6 | 57.4 | 269.8 | 327.2 |
| 17.9 | 298.4 | 472.4 | 133.6 | 606.0 | 75.5 | 260.8 | 336.3 |
| 15.7 | 253.1 | 427.1 | 120.9 | 548.0 | 50.1 | 271.0 | 321.1 |
| 15.0 | 166.2 | 345.9 | 79.3 | 425.2 | 30.4 | 166.0 | 196.4 |
| 13.4 | 189.6 | 368.4 | 84.5 | 452.9 | 19.3 | 141.5 | 160.8 |
| 14.6 | 198.3 | 382.6 | 79.9 | 462.5 | 8.4 | 127.0 | 135.4 |
| 5.0--- | 214.9 | 389.9 | 85.0 | 474.9 | | | 145.0 |

| Average prices | | | | Government-support program | | |
|---|---|---|---|---|---|---|
| Minneapolis | | | | | | |
| ceived by mers 4/ | No. 2 or better feed 5/ | No. 3 or better malting | Portland No. 2 Western | National average loan rate | Target price | Total payments to participants |
| $/bu. | | | | | | $ million |
| 2.29 | 2.09 | 2.55 | 2.59 | 2.08 | 2.60 | 6/ 50 |
| 1.98 | 1.53 | 2.24 | 2.23 | 2.08 | 2.60 | 6/ 159 |
| 1.61 | 1.44 | 1.89 | 1.96 | 1.56 | 2.60 | 7/ 351 |
| 1.81 | 1.78 | 2.04 | 2.09 | 1.49 | 2.60 | 7/ 337 |
| 2.80 | 2.32 | 4.11 | 2.74 | 1.44 | 2.51 | 8/ 179 |
| 2.42 | 2.20 | 3.20 | 2.64 | 1.34 | 2.43 | 9/ 78 |
| 2.14 | 2.13 | 2.42 | 2.65 | 1.28 | 2.36 | 6/ 59 |
| 0-2.20 | | | | 1.32 | 2.36 | |

nary. 3/ Projected. 4/ Excludes support payments. 5/ Starting and diversion payments. 8/ Deficiency, diversion and disaster payments.

Appendix table 6--Oats: Marketing year supply and disappearance, area, and

| Year beginning June 1 | Supply | | | | Food, alcohol, and industrial | |
|---|---|---|---|---|---|---|
| | Beginning stocks | Production | Imports | Total | | |
| | | | | | M | |
| 1984/85 | 180.9 | 473.7 | 33.6 | 688.2 | 41.0 | |
| 1985/86 | 179.9 | 518.5 | 27.2 | 725.7 | 44.0 | |
| 1986/87 | 183.7 | 385.0 | 32.4 | 601.1 | 45.0 | |
| 1987/88 | 132.7 | 373.7 | 45.7 | 552.1 | 49.8 | |
| 1988/89 | 112.0 | 217.6 | 62.9 | 392.5 | 72.7 | |
| 1989/90 | 98.3 | 373.6 | 65.8 | 537.7 | 91.6 | |
| 1990/91 2/ | 156.9 | 357.5 | 71.0 | 585.4 | 100.4 | |
| 1991/92 3/ | 171.2 | 242.5 | 65.0 | 478.8 | | ---125. |

| | Area | | | Yield per harvested acre | Receiv by farmers |
|---|---|---|---|---|---|
| | Set-aside and diverted | Planted | Harvested for grain | | |
| | Million acres | | | Bushels | |
| 1984/85 | 0.1 | 12.4 | 8.2 | 58.0 | 1.67 |
| 1985/86 | 0.1 | 13.3 | 8.2 | 63.7 | 1.23 |
| 1986/87 | 0.5 | 14.7 | 6.9 | 56.3 | 1.21 |
| 1987/88 | 0.8 | 17.9 | 6.9 | 54.3 | 1.56 |
| 1988/89 | 0.3 | 13.9 | 5.5 | 39.3 | 2.61 |
| 1989/90 | 0.3 | 12.1 | 6.9 | 54.3 | 1.49 |
| 1990/91 | 0.2 | 10.4 | 5.9 | 60.1 | 1.14 |
| 1991/92 | 0.5 | 8.7 | 4.8 | 50.6 | 1.10-1. |

1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary
6/ Deficiency and diversion payments. 7/ Deficiency and disaster payments.

, and prices, 1984/85-1991/92

| Disappearance | | | | | Ending stocks May 31 | | |
|---|---|---|---|---|---|---|---|
| Domestic use | | | Exports | Total disappearance | Govt. owned | Privately owned 1/ | Total |
| and al | Seed | Feed and residual | Total | | | | |
| Million bushels | | | | | | | |
| | 31.2 | 435.6 | 507.8 | 0.5 | 508.3 | 1.4 | 178.5 | 179.9 |
| | 32.5 | 464.2 | 540.7 | 1.2 | 541.9 | 1.9 | 181.8 | 183.7 |
| | 38.0 | 384.5 | 467.5 | 0.9 | 468.4 | 3.5 | 129.2 | 132.7 |
| | 31.6 | 358.2 | 439.6 | 0.5 | 440.1 | 3.5 | 108.5 | 112.0 |
| | 27.1 | 193.8 | 293.6 | 0.6 | 294.2 | 2.4 | 95.9 | 98.3 |
| | 23.0 | 265.4 | 380.0 | 0.8 | 380.8 | 0.7 | 156.2 | 156.9 |
| | 19.1 | 294.1 | 413.6 | 0.6 | 414.2 | 0.4 | 170.8 | 171.2 |
| -125.0--- | | 245.0 | 370.0 | 1.0 | 370.8 | | | 108.0 |

| Average prices | | | | Government-support program | | |
|---|---|---|---|---|---|---|
| eceived by rmers 4/ | Minneapolis No. 2 white, heavy | Portland No. 2 white, heavy | Toledo No. 2 white, heavy | National average loan rate | Target price | Total payments to participants |
| $/bu. | | | | | | $ million |
| 1.67 | 1.81 | 2.12 | 1.92 | 1.31 | 1.60 | NA |
| 1.23 | 1.31 | 1.60 | 1.08 | 1.31 | 1.60 | 5/ 8 |
| 1.21 | 1.46 | 1.53 | 1.20 | 0.99 | 1.60 | 6/ 32 |
| 1.56 | 1.92 | 1.76 | 1.68 | 0.94 | 1.60 | 6/ 27 |
| 2.61 | 2.80 | 2.24 | 2.26 | 0.90 | 1.55 | 7/ 47 |
| 1.49 | 1.65 | 1.63 | 1.40 | 0.85 | 1.50 | 8/ 3 |
| 1.14 | 1.30 | 1.58 | 1.17 | 0.81 | 1.45 | 5/ 9 |
| 10-1.20 | | | | 0.83 | 1.45 | |

inary. 3/ Projected. 4/ Excludes support payments. 5/ Deficiency payments.
ents. 8/ Disaster payments.

Appendix table 7--Corn: Marketing year supply and disappearance, specified

| Year beginning September 1 | Supply | | | | Dom | |
|---|---|---|---|---|---|---|
| | Begin-ning stocks | Produc-tion | Imports | Total | Food, alcohol, and industrial | See |
| | | | | | Millio | |
| 1985/86: | | | | | | |
| Sept.-Nov. | 1,648.2 | 8,875.5 | 0.9 | 10,524.6 | 278.0 | 0. |
| Dec.-Feb. | 8,614.7 | --- | 1.0 | 8,615.7 | 264.0 | 0. |
| Mar.-May | 6,587.1 | --- | 2.2 | 6,589.3 | 293.0 | 16. |
| June-Aug. | 4,990.0 | --- | 5.9 | 4,995.9 | 305.0 | 3. |
| Mkt. year | 1,648.2 | 8,875.5 | 10.0 | 10,533.7 | 1,140.0 | 19. |
| 1986/87: | | | | | | |
| Sept.-Nov. | 4,039.5 | 8,225.8 | 0.7 | 12,266.0 | 280.0 | 0. |
| Dec.-Feb. | 10,305.5 | --- | 0.2 | 10,305.7 | 270.0 | 0 |
| Mar.-May | 8,248.2 | --- | 0.4 | 8,248.6 | 310.0 | 16. |
| June-Aug. | 6,332.2 | --- | 0.4 | 6,332.6 | 315.0 | 0 |
| Mkt. year | 4,039.5 | 8,225.8 | 1.7 | 12,267.0 | 1,175.0 | 16. |
| 1987/88: | | | | | | |
| Sept.-Nov. | 4,881.7 | 7,131.3 | 0.5 | 12,013.5 | 292.0 | 0 |
| Dec.-Feb. | 9,771.0 | --- | 0.7 | 9,771.7 | 282.0 | 0 |
| Mar.-May | 7,635.6 | --- | 1.4 | 7,637.0 | 315.0 | 16 |
| June-Aug. | 5,839.2 | --- | 0.8 | 5,840.0 | 323.0 | 0 |
| Mkt. year | 4,881.7 | 7,131.3 | 3.4 | 12,016.4 | 1,212.0 | 17 |
| 1988/89: | | | | | | |
| Sept.-Nov. | 4,259.1 | 4,928.7 | 0.6 | 9,188.4 | 295.0 | 0 |
| Dec.-Feb. | 7,071.6 | --- | 0.6 | 7,072.2 | 285.0 | 0 |
| Mar.-May | 5,203.9 | --- | 1.2 | 5,205.1 | 322.2 | 16 |
| June-Aug. | 3,419.3 | --- | 0.4 | 3,419.7 | 330.2 | 1 |
| Mkt. year | 4,259.1 | 4,928.7 | 2.8 | 9,190.6 | 1,232.4 | 18 |
| 1989/90: | | | | | | |
| Sept.-Nov. | 1,930.4 | 7,525.5 | 0.6 | 9,456.6 | 281.0 | 0 |
| Dec.-Feb. | 7,082.1 | --- | 0.4 | 7,082.5 | 291.0 | 0 |
| Mar.-May | 4,812.4 | --- | 0.6 | 4,813.0 | 348.0 | 16 |
| June-Aug. | 2,843.2 | --- | 0.2 | 2,843.4 | 351.0 | 2 |
| Mkt. year | 1,930.4 | 7,525.5 | 1.9 | 9,457.8 | 1,271.0 | 18 |
| 1990/91: | | | | | | |
| Sept.-Nov. | 1,344.5 | 7,933.1 | 0.9 | 9,278.4 | 307.0 | 0 |
| Dec.-Feb. | 6,940.3 | --- | 0.3 | 6,940.6 | 305.0 | 0 |
| Mar.-May | 4,789.0 | --- | 1.3 | 4,790.2 | 345.8 | 17 |
| June-Aug. | 2,992.0 | --- | 1.5 | 2,993.4 | 347.9 | 1 |
| Mkt. year 2/ | 1,344.5 | 7,933.1 | 3.9 | 9,281.4 | 1,305.7 | 19 |
| 1991/92: | | | | | | |
| Mkt. year 3/ | 1,520.9 | 7,485.9 | 2.0 | 9,008.8 | ---1,350.0--- | |

--- = Not applicable.
1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary

fied periods, 1985/86-1991/92

| Disappearance | | | | | Ending stocks | | |
|---|---|---|---|---|---|---|---|
| --Domestic use---------- | | | | | | | |
| Seed | Feed and residual | Total | Exports | Total disappearance | Govt. owned | Privately owned 1/ | Total |
| llion bushels | | | | | | | |
| 0.0 | 1,217.1 | 1,495.1 | 414.8 | 1,909.9 | 388.6 | 8,226.1 | 8,614.7 |
| 0.0 | 1,304.4 | 1,568.4 | 460.2 | 2,028.6 | 509.4 | 6,077.7 | 6,587.1 |
| 16.1 | 1,088.8 | 1,397.9 | 201.4 | 1,599.3 | 550.9 | 4,439.1 | 4,990.0 |
| 3.4 | 497.1 | 805.5 | 150.9 | 956.4 | 545.7 | 3,493.8 | 4,039.5 |
| 19.5 | 4,107.4 | 5,266.9 | 1,227.3 | 6,494.2 | 545.7 | 3,493.8 | 4,039.5 |
| 0.0 | 1,362.3 | 1,642.3 | 318.2 | 1,960.5 | 968.2 | 9,337.3 | 10,305.5 |
| 0.0 | 1,474.7 | 1,744.7 | 312.8 | 2,057.5 | 1,362.2 | 6,886.0 | 8,248.2 |
| 16.4 | 1,093.9 | 1,420.3 | 496.1 | 1,916.4 | 1,491.5 | 4,840.7 | 6,332.2 |
| 0.3 | 770.3 | 1,085.6 | 365.3 | 1,450.9 | 1,443.2 | 3,438.5 | 4,881.7 |
| 16.7 | 4,701.2 | 5,892.9 | 1,492.4 | 7,385.3 | 1,443.2 | 3,438.5 | 4,881.7 |
| 0.0 | 1,554.9 | 1,846.9 | 395.6 | 2,242.5 | 1,683.4 | 8,087.6 | 9,771.0 |
| 0.0 | 1,449.4 | 1,731.4 | 404.7 | 2,136.1 | 1,767.7 | 5,867.9 | 7,635.6 |
| 16.7 | 956.4 | 1,288.1 | 509.7 | 1,797.8 | 1,304.9 | 4,534.3 | 5,839.2 |
| 0.5 | 851.0 | 1,174.5 | 406.4 | 1,580.9 | 835.0 | 3,424.1 | 4,259.1 |
| 17.2 | 4,811.7 | 6,040.9 | 1,716.4 | 7,757.3 | 835.0 | 3,424.1 | 4,259.1 |
| 0.0 | 1,351.0 | 1,646.0 | 470.8 | 2,116.8 | 611.0 | 6,460.6 | 7,071.6 |
| 0.0 | 1,080.7 | 1,365.7 | 502.6 | 1,868.3 | 465.0 | 4,738.9 | 5,203.9 |
| 16.7 | 855.3 | 1,194.2 | 591.6 | 1,785.8 | 417.7 | 3,001.6 | 3,419.3 |
| 1.7 | 694.0 | 1,025.9 | 463.4 | 1,489.3 | 362.5 | 1,567.9 | 1,930.4 |
| 18.4 | 3,981.0 | 5,231.8 | 2,028.4 | 7,260.2 | 362.5 | 1,567.9 | 1,930.4 |
| 0.0 | 1,510.4 | 1,791.4 | 583.1 | 2,374.5 | 628.2 | 6,453.9 | 7,082.1 |
| 0.0 | 1,297.3 | 1,588.3 | 681.8 | 2,270.1 | 537.2 | 4,275.2 | 4,812.4 |
| 16.1 | 1,004.4 | 1,368.5 | 601.3 | 1,969.8 | 299.3 | 2,543.9 | 2,843.2 |
| 2.8 | 642.6 | 996.4 | 502.6 | 1,499.0 | 233.0 | 1,111.5 | 1,344.5 |
| 18.9 | 4,454.7 | 5,744.6 | 2,368.8 | 8,113.4 | 233.0 | 1,111.5 | 1,344.5 |
| 0.0 | 1,648.3 | 1,955.3 | 382.8 | 2,338.1 | 205.9 | 6,734.4 | 6,940.3 |
| 0.0 | 1,375.9 | 1,680.9 | 470.7 | 2,151.6 | 195.6 | 4,593.4 | 4,789.0 |
| 17.6 | 981.2 | 1,344.5 | 453.7 | 1,798.2 | 435.9 | 2,556.1 | 2,992.0 |
| 1.7 | 703.5 | 1,053.2 | 419.4 | 1,472.6 | 371.1 | 1,149.8 | 1,520.9 |
| 19.3 | 4,708.9 | 6,033.9 | 1,726.6 | 7,760.6 | 371.1 | 1,149.8 | 1,520.9 |
| .0--- | 4,800.0 | 6,150.0 | 1,575.0 | 7,725.0 | 25.0 | 1,258.8 | 1,283.8 |

inary. 3/ Projected.

Appendix table 8--Sorghum: Marketing year supply and disappearance, specified p

| Year beginning September 1 | Supply | | | | Domest | |
|---|---|---|---|---|---|---|
| | Begin-ning stocks | Produc-tion | Imports | Total | Food, alcohol, and industrial | Seed |
| | | | | | | Milli |
| 1985/86: | | | | | | |
| Sept.-Nov. | 300.2 | 1,120.3 | 0.0 | 1,420.5 | 7.6 | 0.0 |
| Dec.-Feb. | 1,112.2 | --- | 0.0 | 1,112.2 | 7.9 | 0.0 |
| Mar.-May | 828.4 | --- | 0.0 | 828.4 | 6.6 | 1.2 |
| June-Aug. | 630.0 | --- | 0.0 | 630.0 | 3.9 | 0.5 |
| Mkt. year | 300.2 | 1,120.3 | 0.0 | 1,420.5 | 26.0 | 1.7 |
| 1986/87: | | | | | | |
| Sept.-Nov. | 551.0 | 938.9 | 0.0 | 1,489.9 | 2.8 | 0.0 |
| Dec.-Feb. | 1,259.2 | --- | 0.0 | 1,259.2 | 2.9 | 0.0 |
| Mar.-May | 1,017.7 | --- | 0.0 | 1,017.7 | 2.4 | 1.0 |
| June-Aug. | 835.0 | --- | 0.0 | 835.0 | 2.2 | 0.6 |
| Mkt. year | 551.0 | 938.9 | 0.0 | 1,489.9 | 10.4 | 1.6 |
| 1987/88: | | | | | | |
| Sept.-Nov. | 743.3 | 730.8 | 0.0 | 1,474.1 | 4.9 | 0.0 |
| Dec.-Feb. | 1,252.4 | --- | 0.0 | 1,252.4 | 5.1 | 0.0 |
| Mar.-May | 1,011.1 | --- | 0.0 | 1,011.1 | 4.2 | 0.8 |
| June-Aug. | 807.8 | --- | 0.0 | 807.9 | 9.3 | 0.5 |
| Mkt. year | 743.3 | 730.8 | 0.0 | 1,474.1 | 23.5 | 1.3 |
| 1988/89: | | | | | | |
| Sept.-Nov. | 662.7 | 576.7 | 0.0 | 1,239.3 | 5.9 | 0.0 |
| Dec.-Feb. | 997.7 | --- | 0.0 | 997.7 | 6.1 | 0.0 |
| Mar.-May | 725.1 | --- | 0.0 | 725.1 | 5.0 | 0.8 |
| June-Aug. | 559.0 | --- | 0.0 | 559.0 | 3.5 | 0.7 |
| Mkt. year | 662.7 | 576.7 | 0.0 | 1,239.3 | 20.5 | 1.5 |
| 1989/90: | | | | | | |
| Sept.-Nov. | 439.5 | 615.4 | 0.0 | 1,054.9 | 3.6 | 0.0 |
| Dec.-Feb. | 775.2 | --- | 0.0 | 775.2 | 4.4 | 0.0 |
| Mar.-May | 513.6 | --- | 0.1 | 513.7 | 2.5 | 0.6 |
| June-Aug. | 335.0 | --- | 0.1 | 335.1 | 3.1 | 0.5 |
| Mkt. year | 439.5 | 615.4 | 0.2 | 1,055.2 | 13.6 | 1.1 |
| 1990/91: | | | | | | |
| Sept.-Nov. | 219.8 | 571.5 | 0.0 | 791.2 | 3.7 | 0.0 |
| Dec.-Feb. | 512.3 | --- | 0.0 | 512.3 | 3.5 | 0.0 |
| Mar.-May | 332.9 | --- | 0.1 | 332.9 | 2.5 | 0.7 |
| June-Aug. | 222.0 | --- | 0.0 | 222.0 | 3.0 | 0.6 |
| Mkt. year 2/ | 219.8 | 571.5 | 0.1 | 791.3 | 12.7 | 1.3 |
| 1991/92: | | | | | | |
| Mkt. year 3/ | 143.2 | 578.3 | 0.1 | 721.6 | ----15.0---- | |

--- = Not applicable.
1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary.

fied periods, 1985/86-1991/92

| Disappearance | | | | | Ending stocks | | |
|---|---|---|---|---|---|---|---|
| Domestic use | | | | | | | |
| Seed | Feed and residual | Total | Exports | Total disappearance | Govt. owned | Privately owned 1/ | Total |
| Million bushels | | | | | | | |
| 0.0 | 230.4 | 238.0 | 70.2 | 308.2 | 138.6 | 973.6 | 1,112.2 |
| 0.0 | 232.8 | 240.7 | 43.1 | 283.9 | 175.2 | 653.2 | 828.4 |
| 1.2 | 163.7 | 171.4 | 26.9 | 198.3 | 181.4 | 448.6 | 630.0 |
| 0.5 | 36.9 | 41.3 | 37.7 | 79.0 | 207.2 | 343.8 | 551.0 |
| 1.7 | 663.8 | 691.5 | 178.0 | 869.5 | 207.2 | 343.8 | 551.0 |
| 0.0 | 180.4 | 183.3 | 47.5 | 230.7 | 292.1 | 967.1 | 1,259.2 |
| 0.0 | 182.3 | 185.3 | 56.2 | 241.5 | 364.9 | 652.8 | 1,017.7 |
| 1.0 | 128.2 | 131.6 | 51.2 | 182.8 | 400.4 | 434.6 | 835.0 |
| 0.6 | 45.3 | 48.1 | 43.5 | 91.6 | 408.9 | 334.4 | 743.3 |
| 1.6 | 536.2 | 548.2 | 198.3 | 746.5 | 408.9 | 334.4 | 743.3 |
| 0.0 | 171.3 | 176.2 | 45.5 | 221.7 | 465.3 | 787.1 | 1,252.4 |
| 0.0 | 173.1 | 178.2 | 63.1 | 241.3 | 545.5 | 465.6 | 1,011.1 |
| 0.8 | 121.2 | 126.2 | 77.1 | 203.3 | 511.4 | 296.4 | 807.8 |
| 0.5 | 89.6 | 99.4 | 45.8 | 145.2 | 463.6 | 199.1 | 662.7 |
| 1.3 | 555.1 | 579.9 | 231.6 | 811.5 | 463.6 | 199.1 | 662.7 |
| 0.0 | 171.3 | 177.1 | 64.5 | 241.6 | 432.9 | 564.8 | 997.7 |
| 0.0 | 173.1 | 179.2 | 93.5 | 272.6 | 396.4 | 328.7 | 725.1 |
| 0.8 | 80.1 | 86.0 | 80.1 | 166.1 | 363.8 | 195.2 | 559.0 |
| 0.7 | 43.2 | 47.4 | 72.1 | 119.5 | 340.9 | 98.6 | 439.5 |
| 1.5 | 467.6 | 489.6 | 310.2 | 799.8 | 340.9 | 98.6 | 439.5 |
| 0.0 | 185.8 | 189.4 | 90.3 | 279.7 | 314.6 | 460.6 | 775.2 |
| 0.0 | 176.0 | 180.4 | 81.2 | 261.6 | 223.0 | 290.6 | 513.6 |
| 0.6 | 94.4 | 97.5 | 81.3 | 178.7 | 190.2 | 144.8 | 335.0 |
| 0.5 | 61.0 | 64.6 | 50.8 | 115.3 | 162.5 | 57.3 | 219.8 |
| 1.1 | 517.2 | 531.9 | 303.5 | 835.4 | 162.5 | 57.3 | 219.8 |
| 0.0 | 218.6 | 222.3 | 56.6 | 278.9 | 157.7 | 354.6 | 512.3 |
| 0.0 | 114.7 | 118.2 | 61.2 | 179.5 | 149.6 | 183.3 | 332.9 |
| 0.7 | 30.9 | 34.1 | 76.8 | 110.9 | 108.4 | 113.6 | 222.0 |
| 0.6 | 37.1 | 40.7 | 38.2 | 78.8 | 64.7 | 78.5 | 143.2 |
| 1.3 | 401.3 | 415.3 | 232.8 | 648.2 | 64.7 | 78.5 | 143.2 |
| -- | 389.6 | 404.6 | 200.0 | 604.6 | | | 117.0 |

ry. 3/ Projected.

Appendix table 9--Barley: Marketing year supply and disappearance, specifie

| Year beginning June 1 | Supply | | | | Domes | |
|---|---|---|---|---|---|---|
| | Begin-ning stocks | Produc-tion | Imports | Total | Food, alcohol, and industrial | Seed |
| | | | | | Million | |
| 1985/86: | | | | | | |
| June-Aug. | 247.4 | 590.2 | 0.7 | 838.3 | 39.1 | 0. |
| Sept.-Nov. | 698.3 | --- | 1.3 | 699.6 | 33.7 | 1. |
| Dec.-Feb. | 572.1 | --- | 2.5 | 574.6 | 33.7 | 1. |
| Mar.-May | 464.7 | --- | 1.7 | 466.4 | 40.7 | 18. |
| Mkt. year | 247.4 | 590.2 | 6.2 | 843.8 | 147.2 | 21. |
| 1986/87: | | | | | | |
| June-Aug. | 327.2 | 608.5 | 1.3 | 937.0 | 42.2 | 0. |
| Sept.-Nov. | 786.8 | --- | 1.0 | 787.8 | 36.5 | 1. |
| Dec.-Feb. | 634.3 | --- | 1.2 | 635.5 | 35.8 | 1. |
| Mar.-May | 499.3 | --- | 3.1 | 502.4 | 41.6 | 15. |
| Mkt. year | 327.2 | 608.5 | 6.6 | 942.3 | 156.1 | 17. |
| 1987/88: | | | | | | |
| June-Aug. | 336.3 | 521.5 | 1.1 | 858.9 | 42.8 | 0. |
| Sept.-Nov. | 725.0 | --- | 2.9 | 727.9 | 37.1 | 1. |
| Dec.-Feb. | 582.4 | --- | 4.3 | 586.7 | 36.3 | 1. |
| Mar.-May | 458.5 | --- | 3.0 | 461.5 | 42.1 | 13. |
| Mkt. year | 336.3 | 521.5 | 11.3 | 869.1 | 158.3 | 15. |
| 1988/89: | | | | | | |
| June-Aug. | 321.1 | 290.0 | 2.8 | 613.9 | 45.2 | 0. |
| Sept.-Nov. | 450.4 | --- | 2.2 | 452.6 | 39.4 | 1. |
| Dec.-Feb. | 372.1 | --- | 2.8 | 374.9 | 37.2 | 1. |
| Mar.-May | 280.6 | --- | 2.7 | 283.3 | 42.9 | 12. |
| Mkt. year | 321.1 | 290.0 | 10.5 | 621.6 | 164.7 | 15. |
| 1989/90: | | | | | | |
| June-Aug. | 196.4 | 404.2 | 3.6 | 604.2 | 46.7 | 0. |
| Sept.-Nov. | 417.9 | --- | 2.0 | 419.9 | 40.1 | 1. |
| Dec.-Feb. | 350.6 | --- | 3.3 | 353.9 | 38.0 | 1. |
| Mar.-May | 252.7 | --- | 4.2 | 256.9 | 40.6 | 11. |
| Mkt. year | 196.4 | 404.2 | 13.1 | 613.7 | 165.4 | 13. |
| 1990/91: | | | | | | |
| June-Aug. | 160.8 | 422.2 | 1.0 | 584.0 | 47.0 | 0. |
| Sept.-Nov. | 410.9 | --- | 1.3 | 412.1 | 41.0 | 1. |
| Dec.-Feb. | 305.7 | --- | 4.2 | 309.9 | 39.5 | 1. |
| Mar.-May | 210.9 | --- | 8.4 | 219.3 | 42.2 | 12. |
| Mkt. year 2/ | 160.8 | 422.2 | 14.9 | 597.9 | 169.7 | 14. |
| 1991/92: | | | | | | |
| June-Aug. | 135.4 | 464.5 | 7.4 | 607.3 | 47.2 | 0. |
| Mkt. year 3/ | 135.4 | 464.5 | 20.0 | 619.9 | ----175.0---- | |

--- = Not applicable.
1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary.

cified periods, 1985/86-1991/92

| Disappearance | | | | | Ending stocks | | |
|---|---|---|---|---|---|---|---|
| Domestic use | | | Exports | Total disappearance | Govt. owned | Privately owned 1/ | Total |
| Seed | Feed and residual | Total | | | | | |
| lion bushels | | | | | | | |
| 0.0 | 90.5 | 129.6 | 10.4 | 140.0 | 20.0 | 678.3 | 698.3 |
| 1.5 | 85.0 | 120.2 | 7.3 | 127.5 | 36.1 | 536.0 | 572.1 |
| 1.7 | 73.2 | 108.6 | 1.3 | 109.9 | 47.3 | 417.4 | 464.7 |
| 18.1 | 79.6 | 138.4 | 0.8 | 139.2 | 57.4 | 269.8 | 327.2 |
| 21.3 | 328.3 | 496.8 | 19.8 | 516.6 | 57.4 | 269.8 | 327.2 |
| 0.0 | 94.5 | 136.7 | 13.5 | 150.2 | 56.0 | 730.8 | 786.8 |
| 1.3 | 72.2 | 110.0 | 43.5 | 153.5 | 66.2 | 568.1 | 634.3 |
| 1.4 | 67.2 | 104.4 | 31.8 | 136.2 | 75.2 | 424.1 | 499.3 |
| 15.2 | 64.5 | 121.3 | 44.8 | 166.1 | 75.5 | 260.8 | 336.3 |
| 17.9 | 298.4 | 472.4 | 133.6 | 606.0 | 75.5 | 260.8 | 336.3 |
| 0.0 | 74.3 | 117.1 | 16.8 | 133.9 | 74.9 | 650.1 | 725.0 |
| 1.1 | 64.8 | 103.0 | 42.5 | 145.5 | 79.5 | 502.9 | 582.4 |
| 1.3 | 57.6 | 95.2 | 33.0 | 128.2 | 57.0 | 401.5 | 458.5 |
| 13.3 | 56.4 | 111.8 | 28.6 | 140.4 | 50.1 | 271.0 | 321.1 |
| 15.7 | 253.1 | 427.1 | 120.9 | 548.0 | 50.1 | 271.0 | 321.1 |
| 0.0 | 92.5 | 137.7 | 25.8 | 163.5 | 35.9 | 414.5 | 450.4 |
| 1.1 | 27.4 | 67.9 | 12.6 | 80.5 | 35.9 | 336.2 | 372.1 |
| 1.2 | 40.6 | 79.0 | 15.3 | 94.3 | 34.1 | 246.5 | 280.6 |
| 12.7 | 5.7 | 61.3 | 25.6 | 86.9 | 30.4 | 166.0 | 196.4 |
| 15.0 | 166.2 | 345.9 | 79.3 | 425.2 | 30.4 | 166.0 | 196.4 |
| 0.0 | 113.0 | 159.7 | 26.5 | 186.2 | 36.6 | 381.3 | 417.9 |
| 1.0 | 11.0 | 52.1 | 17.2 | 69.3 | 36.3 | 314.3 | 350.6 |
| 1.1 | 39.3 | 78.4 | 22.8 | 101.2 | 32.1 | 220.6 | 252.7 |
| 11.3 | 26.3 | 78.2 | 17.9 | 96.1 | 19.3 | 141.5 | 160.8 |
| 13.4 | 189.6 | 368.4 | 84.5 | 452.9 | 19.3 | 141.5 | 160.8 |
| 0.0 | 95.3 | 142.3 | 30.9 | 173.2 | 14.3 | 396.6 | 410.9 |
| 1.0 | 39.0 | 81.0 | 25.4 | 106.4 | 12.1 | 293.6 | 305.7 |
| 1.1 | 39.8 | 80.4 | 18.6 | 99.0 | 9.6 | 201.3 | 210.9 |
| 12.5 | 24.2 | 78.9 | 5.0 | 83.9 | 8.4 | 127.0 | 135.4 |
| 14.6 | 198.3 | 382.6 | 79.9 | 462.5 | 8.4 | 127.0 | 135.4 |
| 0.0 | 105.5 | 152.7 | 13.5 | 166.2 | 7.7 | 433.4 | 441.1 |
| ---- | 214.9 | 389.9 | 85.0 | 474.9 | | | 145.0 |

nary. 3/ Projected.

Appendix table 10--Oats: Marketing year supply and disappearance, 1985/86-199

| Year beginning June 1 | Supply | | | | Dome | |
|---|---|---|---|---|---|---|
| | Begin-ning stocks | Produc-tion | Imports | Total | Food, alcohol, and industrial | Seed |
| | | | | | | Mill |
| 1985/86: | | | | | | |
| June-Aug. | 179.9 | 518.5 | 4.4 | 702.9 | 12.8 | 0.0 |
| Sept.-Nov. | 554.1 | --- | 4.2 | 558.3 | 11.2 | 3.9 |
| Dec.-Feb. | 424.8 | --- | 8.9 | 433.7 | 10.9 | 1.0 |
| Mar.-May | 312.5 | --- | 9.7 | 322.2 | 9.0 | 27.6 |
| Mkt. year | 179.9 | 518.5 | 27.2 | 725.7 | 44.0 | 32.5 |
| 1986/87: | | | | | | |
| June-Aug. | 183.7 | 385.0 | 8.7 | 577.4 | 13.1 | 0.0 |
| Sept.-Nov. | 451.6 | --- | 4.8 | 456.4 | 11.5 | 4.6 |
| Dec.-Feb. | 342.2 | --- | 9.2 | 351.4 | 11.1 | 1.1 |
| Mar.-May | 248.5 | --- | 9.6 | 258.2 | 9.3 | 32.3 |
| Mkt. year | 183.7 | 385.0 | 32.4 | 601.1 | 45.0 | 38.0 |
| 1987/88: | | | | | | |
| June-Aug. | 132.7 | 373.7 | 7.0 | 513.4 | 14.5 | 0.0 |
| Sept.-Nov. | 393.9 | --- | 8.1 | 402.0 | 12.7 | 3.8 |
| Dec.-Feb. | 294.2 | --- | 15.8 | 310.0 | 12.3 | 0.9 |
| Mar.-May | 212.2 | --- | 14.8 | 227.1 | 10.2 | 26.9 |
| Mkt. year | 132.7 | 373.7 | 45.7 | 552.1 | 49.8 | 31.6 |
| 1988/89: | | | | | | |
| June-Aug. | 112.0 | 217.6 | 12.3 | 341.8 | 21.2 | 0.0 |
| Sept.-Nov. | 263.8 | --- | 11.9 | 275.7 | 18.6 | 3.3 |
| Dec.-Feb. | 204.4 | --- | 20.1 | 224.5 | 18.0 | 0.8 |
| Mar.-May | 159.9 | --- | 18.6 | 178.5 | 15.0 | 23.0 |
| Mkt. year | 112.0 | 217.6 | 62.9 | 392.5 | 72.7 | 27.1 |
| 1989/90: | | | | | | |
| June-Aug. | 98.3 | 373.6 | 17.0 | 488.9 | 26.6 | 0.0 |
| Sept.-Nov. | 373.3 | --- | 17.5 | 390.8 | 23.3 | 2.8 |
| Dec.-Feb. | 287.3 | --- | 15.7 | 303.0 | 22.6 | 0.7 |
| Mar.-May | 214.7 | --- | 15.7 | 230.4 | 19.1 | 19.5 |
| Mkt. year | 98.3 | 373.6 | 65.8 | 537.7 | 91.6 | 23.0 |
| 1990/91: | | | | | | |
| June-Aug. | 156.9 | 357.5 | 17.5 | 532.0 | 28.7 | 0.0 |
| Sept.-Nov. | 351.7 | --- | 11.7 | 363.4 | 24.7 | 2.7 |
| Dec.-Feb. | 294.1 | --- | 18.2 | 312.3 | 24.6 | 0.6 |
| Mar.-May | 229.3 | --- | 23.6 | 252.8 | 22.4 | 15.8 |
| Mkt. year 1/ | 156.9 | 357.5 | 71.0 | 585.4 | 100.4 | 19.1 |
| 1991/92: | | | | | | |
| June-Aug. | 171.2 | 242.5 | 21.7 | 435.5 | 29.0 | 0.0 |
| Mkt. year 2/ | 171.2 | 242.5 | 65.0 | 478.8 | ---125.0--- | |

--- = Not applicable.
1/ Preliminary. 2/ Projected.

6-1991/92

| Disappearance | | | | | Ending stocks | | |
|---|---|---|---|---|---|---|---|
| -Domestic use- | | | | | | | |
| Seed | Feed and residual | Total | Exports | Total disap-pearance | Govt. owned | Privately owned | Total |
| Million bushels | | | | | | | |
| 0.0 | 135.8 | 148.7 | 0.1 | 148.8 | 1.5 | 552.6 | 554.1 |
| 3.9 | 118.1 | 133.2 | 0.3 | 133.5 | 1.9 | 422.9 | 424.8 |
| 1.0 | 109.3 | 121.2 | 0.1 | 121.2 | 2.0 | 310.5 | 312.5 |
| 27.6 | 101.0 | 137.7 | 0.8 | 138.4 | 1.9 | 181.8 | 183.7 |
| 32.5 | 464.2 | 540.7 | 1.2 | 541.9 | 1.9 | 181.8 | 183.7 |
| 0.0 | 112.5 | 125.6 | 0.2 | 125.9 | 2.4 | 449.2 | 451.6 |
| 4.6 | 97.8 | 113.9 | 0.3 | 114.2 | 3.2 | 339.0 | 342.2 |
| 1.1 | 90.5 | 102.8 | 0.1 | 102.9 | 3.6 | 244.9 | 248.5 |
| 32.3 | 83.7 | 125.2 | 0.3 | 125.5 | 3.5 | 129.2 | 132.7 |
| 38.0 | 384.5 | 467.5 | 0.9 | 468.4 | 3.5 | 129.2 | 132.7 |
| 0.0 | 104.8 | 119.3 | 0.2 | 119.5 | 3.3 | 390.6 | 393.9 |
| 3.8 | 91.1 | 107.6 | 0.1 | 107.8 | 3.4 | 290.8 | 294.2 |
| 0.9 | 84.3 | 97.6 | 0.1 | 97.7 | 3.4 | 208.8 | 212.2 |
| 26.9 | 77.9 | 115.0 | 0.1 | 115.1 | 3.5 | 108.5 | 112.0 |
| 31.6 | 358.2 | 439.6 | 0.5 | 440.1 | 3.5 | 108.5 | 112.0 |
| 0.0 | 56.7 | 77.9 | 0.2 | 78.1 | 3.0 | 260.8 | 263.8 |
| 3.3 | 49.3 | 71.1 | 0.1 | 71.3 | 2.5 | 201.9 | 204.4 |
| 0.8 | 45.6 | 64.4 | 0.2 | 64.6 | 2.6 | 157.3 | 159.9 |
| 23.0 | 42.2 | 80.1 | 0.1 | 80.2 | 2.4 | 95.9 | 98.3 |
| 27.1 | 193.8 | 293.6 | 0.6 | 294.2 | 2.4 | 95.9 | 98.3 |
| 0.0 | 88.7 | 115.3 | 0.2 | 115.6 | 1.3 | 372.0 | 373.3 |
| 2.8 | 77.1 | 103.2 | 0.3 | 103.5 | 1.2 | 286.1 | 287.3 |
| 0.7 | 64.8 | 88.1 | 0.2 | 88.2 | 1.1 | 213.6 | 214.7 |
| 19.5 | 34.7 | 73.3 | 0.2 | 73.5 | 0.7 | 156.2 | 156.9 |
| 23.0 | 265.4 | 380.0 | 0.8 | 380.8 | 0.7 | 156.2 | 156.9 |
| 0.0 | 151.4 | 180.1 | 0.2 | 180.2 | 0.6 | 351.1 | 351.7 |
| 2.7 | 41.7 | 69.1 | 0.2 | 69.3 | 0.6 | 293.5 | 294.1 |
| 0.6 | 57.8 | 83.0 | 0.1 | 83.1 | 0.5 | 228.8 | 229.3 |
| 15.8 | 43.3 | 81.5 | 0.1 | 81.6 | 0.4 | 170.8 | 171.2 |
| 19.1 | 294.1 | 413.6 | 0.6 | 414.2 | 0.4 | 170.8 | 171.2 |
| 0.0 | 124.6 | 153.6 | 0.1 | 153.7 | 0.6 | 281.1 | 281.7 |
| -- | 245.0 | 370.0 | 1.0 | 370.8 | | | 108.0 |

Appendix table 11--Average prices received by farmers, United States, by month, and loan rate, 1982-91 1/

| Year | Sept. | Oct. 2/ | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Average 3/ | Loan rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $/bu. | | | | | | | | |
| Corn: | | | | | | | | | | | | | | |
| 1982 | 2.15 | 1.98 | 2.13 | 2.26 | 2.36 | 2.56 | 2.71 | 2.95 | 3.03 | 3.04 | 3.13 | 3.35 | 2.55 | 2.55 |
| 1983 | 3.32 | 3.15 | 3.17 | 3.15 | 3.15 | 3.11 | 3.21 | 3.32 | 3.34 | 3.36 | 3.30 | 3.12 | 3.21 | 2.65 |
| 1984 | 2.90 | 2.65 | 2.55 | 2.56 | 2.64 | 2.62 | 2.67 | 2.70 | 2.68 | 2.64 | 2.60 | 2.44 | 2.63 | 2.55 |
| 1985 | 2.29 | 2.11 | 2.21 | 2.29 | 2.33 | 2.32 | 2.29 | 2.30 | 2.39 | 2.32 | 2.00 | 1.73 | 2.23 | 2.55 |
| 1986 | 1.45 | 1.40 | 1.47 | 1.50 | 1.48 | 1.42 | 1.47 | 1.52 | 1.66 | 1.69 | 1.60 | 1.47 | 1.50 | 1.92 |
| 1987 | 1.49 | 1.55 | 1.61 | 1.72 | 1.77 | 1.83 | 1.86 | 1.88 | 1.94 | 2.41 | 2.72 | 2.65 | 1.94 | 1.82 |
| 1988 | 2.60 | 2.58 | 2.51 | 2.53 | 2.60 | 2.59 | 2.60 | 2.56 | 2.58 | 2.52 | 2.47 | 2.27 | 2.54 | 1.77 |
| 1989 | 2.29 | 2.22 | 2.24 | 2.27 | 2.31 | 2.32 | 2.37 | 2.51 | 2.62 | 2.63 | 2.62 | 2.51 | 2.36 | 1.65 |
| 1990 | 2.32 | 2.19 | 2.16 | 2.22 | 2.27 | 2.32 | 2.39 | 2.42 | 2.38 | 2.31 | 2.27 | 2.33 | 2.28 | 1.57 |
| 1991 | 2.34 | 2.29 | | | | | | | | | | | | |
| | | | | | | $/cwt. | | | | | | | | |
| Sorghum: | | | | | | | | | | | | | | |
| 1982 | 3.80 | 3.70 | 3.78 | 3.97 | 4.09 | 4.42 | 4.67 | 4.92 | 5.05 | 5.05 | 5.03 | 5.29 | 4.41 | 4.32 |
| 1983 | 5.26 | 5.01 | 4.98 | 4.93 | 4.92 | 4.74 | 4.85 | 5.00 | 5.08 | 4.94 | 4.64 | 4.58 | 4.89 | 4.50 |
| 1984 | 4.24 | 4.05 | 4.05 | 4.15 | 4.16 | 4.10 | 4.24 | 4.46 | 4.54 | 4.52 | 4.04 | 3.74 | 4.15 | 4.32 |
| 1985 | 3.27 | 3.30 | 3.47 | 3.76 | 3.69 | 3.55 | 3.67 | 3.80 | 3.99 | 3.43 | 3.06 | 2.66 | 3.45 | 4.32 |
| 1986 | 2.36 | 2.34 | 2.39 | 2.41 | 2.37 | 2.36 | 2.44 | 2.58 | 2.69 | 2.79 | 2.66 | 2.52 | 2.45 | 3.25 |
| 1987 | 2.43 | 2.48 | 2.69 | 2.72 | 2.75 | 2.88 | 2.92 | 2.94 | 2.91 | 4.13 | 4.56 | 4.41 | 3.04 | 3.11 |
| 1988 | 4.26 | 4.16 | 3.99 | 4.07 | 4.09 | 4.05 | 4.04 | 4.21 | 4.03 | 3.90 | 4.00 | 3.81 | 4.05 | 3.00 |
| 1989 | 3.80 | 3.61 | 3.68 | 3.54 | 3.58 | 3.53 | 3.69 | 3.89 | 4.07 | 4.29 | 4.44 | 4.14 | 3.75 | 2.80 |
| 1990 | 3.96 | 3.55 | 3.57 | 3.67 | 3.72 | 3.88 | 3.93 | 4.05 | 4.11 | 3.89 | 3.96 | 4.01 | 3.79 | 1.49 |
| 1991 | 4.10 | 3.91 | | | | | | | | | | | | |

| Year | June | July | Aug. | Sept. | Oct. 2/ | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Average 3/ | Loan rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $/bu. | | | | | | | | |
| Oats: | | | | | | | | | | | | | | |
| 1982 | 1.88 | 1.57 | 1.39 | 1.35 | 1.32 | 1.40 | 1.44 | 1.46 | 1.48 | 1.49 | 1.54 | 1.54 | 1.49 | 1.31 |
| 1983 | 1.51 | 1.46 | 1.45 | 1.55 | 1.62 | 1.67 | 1.73 | 1.81 | 1.88 | 1.81 | 1.82 | 1.84 | 1.62 | 1.36 |
| 1984 | 1.80 | 1.68 | 1.62 | 1.60 | 1.69 | 1.64 | 1.72 | 1.74 | 1.69 | 1.68 | 1.68 | 1.60 | 1.67 | 1.31 |
| 1985 | 1.59 | 1.31 | 1.16 | 1.10 | 1.08 | 1.17 | 1.20 | 1.18 | 1.16 | 1.14 | 1.13 | 1.21 | 1.23 | 1.31 |
| 1986 | 1.10 | 0.90 | 0.86 | 0.99 | 1.10 | 1.32 | 1.44 | 1.46 | 1.47 | 1.45 | 1.50 | 1.57 | 1.21 | 0.99 |
| 1987 | 1.52 | 1.29 | 1.40 | 1.49 | 1.61 | 1.62 | 1.76 | 1.79 | 1.84 | 1.78 | 1.82 | 1.84 | 1.56 | 0.94 |
| 1988 | 2.63 | 2.86 | 2.54 | 2.57 | 2.56 | 2.41 | 2.47 | 2.52 | 2.46 | 2.41 | 2.24 | 2.13 | 2.61 | 0.90 |
| 1989 | 1.82 | 1.53 | 1.47 | 1.38 | 1.47 | 1.48 | 1.53 | 1.47 | 1.43 | 1.39 | 1.44 | 1.45 | 1.49 | 0.85 |
| 1990 | 1.33 | 1.15 | 1.06 | 1.09 | 1.14 | 1.16 | 1.17 | 1.13 | 1.13 | 1.16 | 1.16 | 1.16 | 1.14 | 0.81 |
| 1991 | 1.08 | 1.08 | 1.09 | 1.12 | 1.19 | | | | | | | | | |
| All barley: | | | | | | | | | | | | | | |
| 1982 | 2.39 | 2.16 | 2.20 | 2.17 | 1.98 | 2.06 | 2.19 | 2.16 | 2.00 | 2.09 | 2.22 | 2.36 | 2.18 | 2.08 |
| 1983 | 2.32 | 2.20 | 2.34 | 2.46 | 2.53 | 2.55 | 2.55 | 2.55 | 2.47 | 2.50 | 2.54 | 2.78 | 2.47 | 2.16 |
| 1984 | 2.61 | 2.54 | 2.26 | 2.25 | 2.29 | 2.25 | 2.19 | 2.24 | 2.21 | 2.18 | 2.16 | 2.22 | 2.29 | 2.08 |
| 1985 | 2.14 | 2.08 | 1.98 | 1.88 | 1.96 | 2.05 | 2.07 | 2.05 | 1.95 | 1.88 | 1.85 | 1.73 | 1.98 | 2.08 |
| 1986 | 1.57 | 1.67 | 1.51 | 1.45 | 1.58 | 1.69 | 1.62 | 1.60 | 1.63 | 1.69 | 1.69 | 1.76 | 1.61 | 1.56 |
| 1987 | 1.74 | 1.84 | 2.00 | 1.87 | 1.73 | 1.88 | 1.83 | 1.78 | 1.72 | 1.65 | 1.74 | 1.79 | 1.81 | 1.49 |
| 1988 | 2.45 | 2.97 | 2.96 | 2.94 | 2.86 | 2.96 | 2.73 | 2.74 | 2.67 | 2.74 | 2.73 | 2.64 | 2.80 | 1.44 |
| 1989 | 2.34 | 2.16 | 2.70 | 2.47 | 2.41 | 2.47 | 2.47 | 2.33 | 2.33 | 2.19 | 2.22 | 2.36 | 2.42 | 1.34 |
| 1990 | 2.29 | 2.16 | 2.13 | 2.13 | 2.04 | 2.16 | 2.13 | 2.14 | 2.12 | 2.15 | 2.10 | 2.04 | 2.14 | 1.28 |
| 1991 | 1.95 | 1.71 | 2.06 | 2.04 | 2.11 | | | | | | | | | |

| Year | June | July | Aug. | Sept. | Oct. 2/ | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $/bu. | | | | | | |
| Feed barley: | | | | | | | | | | | | |
| 1982 | 2.52 | 2.23 | 1.98 | 1.91 | 1.87 | 1.94 | 1.98 | 2.07 | 1.99 | 2.08 | 2.26 | 2.43 |
| 1983 | 2.52 | 2.31 | 2.23 | 2.41 | 2.45 | 2.51 | 2.52 | 2.58 | 2.47 | 2.54 | 2.55 | 2.86 |
| 1984 | 2.72 | 2.60 | 2.10 | 2.13 | 2.19 | 2.19 | 2.20 | 2.22 | 2.27 | 2.19 | 2.16 | 2.30 |
| 1985 | 2.26 | 2.05 | 1.75 | 1.74 | 1.85 | 1.90 | 2.03 | 2.00 | 1.90 | 1.83 | 1.85 | 1.81 |
| 1986 | 1.61 | 1.44 | 1.21 | 1.33 | 1.49 | 1.62 | 1.59 | 1.56 | 1.61 | 1.69 | 1.71 | 1.84 |
| 1987 | 1.79 | 1.67 | 1.54 | 1.57 | 1.66 | 1.68 | 1.63 | 1.65 | 1.64 | 1.59 | 1.73 | 1.76 |
| 1988 | 2.07 | 2.34 | 2.37 | 2.39 | 2.34 | 2.30 | 2.27 | 2.28 | 2.29 | 2.35 | 2.32 | 2.27 |
| 1989 | 2.18 | 1.96 | 2.06 | 1.98 | 1.97 | 2.08 | 2.10 | 2.02 | 2.01 | 1.99 | 2.08 | 2.28 |
| 1990 | 2.26 | 2.04 | 1.77 | 1.85 | 1.91 | 1.95 | 1.89 | 2.02 | 1.93 | 1.95 | 1.99 | 2.00 |
| 1991 | 1.90 | 1.60 | 1.63 | 1.84 | 1.93 | | | | | | | |
| Malting barley: | | | | | | | | | | | | |
| 1982 | 2.26 | 2.10 | 2.38 | 2.58 | 2.22 | 2.26 | 2.39 | 2.32 | 2.00 | 2.09 | 2.13 | 2.18 |
| 1983 | 2.05 | 2.06 | 2.50 | 2.69 | 2.72 | 2.61 | 2.61 | 2.50 | 2.47 | 2.46 | 2.54 | 2.53 |
| 1984 | 2.52 | 2.48 | 2.50 | 2.52 | 2.52 | 2.39 | 2.18 | 2.29 | 2.11 | 2.17 | 2.17 | 2.10 |
| 1985 | 2.02 | 2.13 | 2.49 | 2.33 | 2.24 | 2.32 | 2.19 | 2.13 | 1.99 | 1.93 | 1.85 | 1.66 |
| 1986 | 1.52 | 2.07 | 2.23 | 1.85 | 1.83 | 1.78 | 1.65 | 1.70 | 1.69 | 1.69 | 1.65 | 1.66 |
| 1987 | 1.68 | 2.04 | 2.55 | 2.39 | 1.88 | 2.07 | 2.01 | 2.15 | 1.80 | 1.69 | 1.75 | 1.81 |
| 1988 | 2.80 | 3.26 | 3.38 | 3.47 | 3.41 | 3.34 | 3.27 | 3.32 | 3.22 | 3.22 | 3.16 | 3.04 |
| 1989 | 2.62 | 2.68 | 3.04 | 2.87 | 2.89 | 2.91 | 2.88 | 2.73 | 2.61 | 2.45 | 2.51 | 2.53 |
| 1990 | 2.35 | 2.37 | 2.47 | 2.42 | 2.29 | 2.34 | 2.44 | 2.24 | 2.33 | 2.40 | 2.26 | 2.10 |
| 1991 | 1.88 | 2.03 | 2.77 | 2.66 | 2.75 | | | | | | | |

1/ Prices do not include an allowance for loans outstanding and government purchases. 2/ October 1991 data is preliminary. 3/ U.S. season-average prices based on monthly prices weighted by monthly marketings.

Source: Agricultural Prices, Agricultural Statistics Board, USDA.

Appendix table 12--Cash prices at principal markets, 1985-91

| Year | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $/bu. | | | | | | | |
| Corn, no. 2 yellow, Central Illinois: | | | | | | | | | | | | | |
| 1985 | 2.28 | 2.10 | 2.32 | 2.38 | 2.36 | 2.33 | 2.29 | 2.31 | 2.42 | 2.41 | 1.93 | 1.52 | 2.22 |
| 1986 | 1.34 | 1.34 | 1.55 | 1.52 | 1.44 | 1.38 | 1.46 | 1.56 | 1.75 | 1.74 | 1.60 | 1.46 | 1.51 |
| 1987 | 1.50 | 1.64 | 1.74 | 1.78 | 1.84 | 1.90 | 1.92 | 1.92 | 1.97 | 2.66 | 2.85 | 2.70 | 2.03 |
| 1988 | 2.68 | 2.70 | 2.54 | 2.58 | 2.62 | 2.60 | 2.64 | 2.58 | 2.64 | 2.53 | 2.44 | 2.30 | 2.57 |
| 1989 | 2.35 | 2.25 | 2.29 | 2.29 | 2.29 | 2.34 | 2.44 | 2.64 | 2.73 | 2.70 | 2.68 | 2.54 | 2.46 |
| 1990 | 2.25 | 2.18 | 2.20 | 2.27 | 2.31 | 2.36 | 2.45 | 2.50 | 2.41 | 2.34 | 2.34 | 2.45 | 2.34 |
| 1991 | 2.41 | 2.40 | | | | | | | | | | | |
| Corn, no. 2 yellow, Gulf Ports: | | | | | | | | | | | | | |
| 1985 | 2.59 | 2.50 | 2.69 | 2.75 | 2.72 | 2.63 | 2.56 | 2.57 | 2.68 | 2.63 | 2.12 | 1.85 | 2.52 |
| 1986 | 1.68 | 1.66 | 1.83 | 1.81 | 1.73 | 1.70 | 1.83 | 1.89 | 2.06 | 2.06 | 1.95 | 1.81 | 1.83 |
| 1987 | 1.86 | 1.99 | 2.08 | 2.11 | 2.20 | 2.23 | 2.29 | 2.28 | 2.29 | 3.05 | 3.22 | 3.02 | 2.39 |
| 1988 | 3.08 | 3.07 | 2.89 | 2.99 | 3.01 | 2.99 | 3.02 | 2.93 | 2.99 | 2.87 | 2.73 | 2.57 | 2.93 |
| 1989 | 2.60 | 2.40 | 2.75 | 2.75 | 2.69 | 2.70 | 2.72 | 3.01 | 3.08 | 3.05 | 2.92 | 2.79 | 2.79 |
| 1990 | 2.59 | 2.55 | 2.54 | 2.60 | 2.68 | 2.70 | 2.77 | 2.80 | 2.69 | 3.05 | 2.67 | 2.79 | 2.70 |
| 1991 | 2.76 | 2.76 | | | | | | | | | | | |
| Corn, no. 2 yellow, St. Louis: | | | | | | | | | | | | | |
| 1985 | 2.38 | 2.27 | 2.50 | 2.59 | 2.55 | 2.50 | 2.42 | 2.46 | 2.56 | 2.52 | 2.01 | 1.67 | 2.37 |
| 1986 | 1.47 | 1.46 | 1.68 | 1.69 | 1.61 | 1.57 | 1.65 | 1.74 | 1.93 | 1.92 | 1.79 | 1.65 | 1.68 |
| 1987 | 1.65 | 1.78 | 1.91 | 1.97 | 2.05 | 2.07 | 2.09 | 2.10 | 2.13 | 2.77 | 2.96 | 2.81 | 2.19 |
| 1988 | 2.82 | 2.82 | 2.70 | 2.76 | 2.81 | 2.79 | 2.82 | 2.76 | 2.83 | 2.58 | 2.57 | 2.38 | 2.72 |
| 1989 | 2.38 | 2.39 | 2.48 | 2.44 | 2.45 | 2.48 | 2.57 | 2.77 | 2.86 | 2.85 | 2.75 | 2.59 | 2.58 |
| 1990 | 2.37 | 2.32 | 2.65 | 2.41 | 2.46 | 2.50 | 2.58 | 2.61 | 2.52 | 2.47 | 2.45 | 2.54 | 2.49 |
| 1991 | 2.44 | 2.46 | | | | | | | | | | | |
| Sorghum, no.2 yellow, Gulf Ports 1/: | | | | | | | | | | | | | |
| 1985 | 3.70 | 3.97 | 4.34 | 4.52 | 4.45 | 4.30 | 4.28 | 4.50 | 4.80 | 3.90 | 3.37 | 2.71 | 4.07 |
| 1986 | 2.95 | 3.15 | 3.26 | 3.15 | 3.05 | 3.09 | 3.35 | 3.30 | 3.51 | 3.50 | 3.30 | 3.04 | 3.22 |
| 1987 | 3.13 | 3.35 | 3.55 | 3.50 | 3.65 | 3.80 | 3.86 | 3.70 | 3.73 | 5.00 | 5.33 | 4.93 | 3.96 |
| 1988 | 4.99 | 4.91 | 4.64 | 4.93 | 4.99 | 4.99 | 5.02 | 4.89 | 5.05 | 4.75 | 4.02 | 4.53 | 4.81 |
| 1989 | 4.67 | 4.61 | 4.69 | 4.70 | 4.62 | 4.59 | 4.70 | 4.97 | 5.04 | 4.87 | 4.95 | 4.73 | 4.76 |
| 1990 | 4.52 | 4.43 | 4.43 | 4.60 | 4.76 | 4.82 | 4.97 | 4.94 | 4.64 | 4.45 | 4.54 | 4.72 | 4.65 |
| 1991 | 4.81 | 4.86 | | | | | | | | | | | |
| | | | | | | $/cwt | | | | | | | |
| Sorghum, no. 2 yellow, Kansas City: | | | | | | | | | | | | | |
| 1985 | 3.56 | 3.62 | 3.75 | 3.97 | 3.95 | 3.80 | 3.82 | 4.00 | 4.25 | 4.00 | 3.20 | 2.71 | 3.72 |
| 1986 | 2.47 | 2.60 | 2.70 | 2.62 | 2.50 | 2.57 | 2.80 | 2.85 | 3.10 | 3.20 | 2.80 | 2.55 | 2.73 |
| 1987 | 2.64 | 2.75 | 2.90 | 2.95 | 3.05 | 3.24 | 3.27 | 3.16 | 3.21 | 4.58 | 4.79 | 4.28 | 3.40 |
| 1988 | 4.27 | 4.17 | 4.00 | 4.23 | 4.24 | 4.26 | 4.32 | 4.17 | 4.29 | 4.15 | 3.96 | 3.92 | 4.17 |
| 1989 | 4.73 | 3.91 | 4.00 | 3.98 | 3.91 | 3.84 | 4.01 | 4.32 | 4.47 | 4.54 | 4.48 | 4.27 | 4.21 |
| 1990 | 3.89 | 3.79 | 3.85 | 3.97 | 4.12 | 4.21 | 4.35 | 4.34 | 4.13 | 4.02 | 4.05 | 4.22 | 4.08 |
| 1991 | 4.24 | 4.30 | | | | | | | | | | | |
| Sorghum, no. 2 yellow, Texas High Plains: 2/ | | | | | | | | | | | | | |
| 1985 | 4.19 | 4.38 | 4.30 | 4.49 | 4.47 | 4.36 | 4.33 | 4.48 | 4.77 | 4.84 | 3.93 | 3.36 | 4.32 |
| 1986 | 3.35 | 3.24 | 2.97 | 3.06 | 2.94 | 2.89 | 3.06 | 3.32 | 3.56 | 3.60 | 3.58 | 3.30 | 3.24 |
| 1987 | 3.19 | 3.27 | 3.27 | 3.39 | 3.40 | 3.53 | 3.56 | 3.54 | 3.55 | 4.84 | 5.25 | 4.96 | 3.81 |
| 1988 | 4.98 | 4.95 | 4.62 | 4.63 | 4.75 | 4.69 | 4.72 | 4.63 | 4.50 | 4.59 | 4.46 | 4.44 | 4.66 |
| 1989 | 4.39 | 4.13 | 4.06 | 4.03 | 4.04 | 4.02 | 4.10 | 4.38 | 4.96 | 4.94 | 4.82 | 4.63 | 4.38 |
| 1990 | 4.27 | 4.17 | 4.28 | 4.49 | 4.49 | 4.57 | 4.69 | 4.66 | 4.66 | 4.48 | 4.39 | 4.57 | 4.48 |
| 1991 | 4.52 | 4.56 | | | | | | | | | | | |

| Year | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $/bu. | | | | | | | |
| Barley, no. 3 or better malting, 65% or better plump, Minneapolis: | | | | | | | | | | | | | |
| 1985 | 2.46 | 2.25 | 2.03 | 2.15 | 2.10 | 2.27 | 2.29 | 2.28 | 2.20 | 2.34 | 2.40 | 2.07 | 2.24 |
| 1986 | 1.84 | 1.75 | 1.61 | 1.76 | 1.93 | 2.02 | 1.88 | 1.81 | 1.92 | 2.01 | 2.05 | 2.12 | 1.89 |
| 1987 | 2.07 | 1.93 | 1.73 | 1.98 | 2.08 | 2.05 | 2.01 | 2.02 | 2.15 | 2.08 | 2.11 | 2.24 | 2.04 |
| 1988 | 3.61 | 3.87 | 4.25 | 4.40 | 4.39 | 4.14 | 3.82 | 4.14 | 4.19 | 4.33 | 4.29 | 3.84 | 4.11 |
| 1989 | 3.02 | 3.33 | 3.57 | 3.43 | 3.48 | 3.18 | 3.19 | 3.20 | 3.02 | 2.83 | 2.97 | 3.17 | 3.20 |
| 1990 | 2.92 | 2.36 | 2.35 | 2.32 | 2.30 | 2.40 | 2.31 | 2.33 | 2.38 | 2.46 | 2.48 | 2.41 | 2.42 |
| 1991 | 2.26 | 2.14 | 2.14 | 2.21 | 2.38 | | | | | | | | |
| Barley, no. 2 feed, Minneapolis 3/, 4/: | | | | | | | | | | | | | |
| 1985 | 1.90 | 1.66 | 1.46 | 1.40 | 1.41 | 1.49 | 1.60 | 1.57 | NQ | NQ | NQ | 1.31 | 1.53 |
| 1986 | 1.23 | 1.16 | 1.13 | 1.27 | 1.50 | 1.63 | 1.23 | NQ | NQ | 1.64 | 1.76 | 1.86 | 1.44 |
| 1987 | 1.73 | 1.59 | 1.60 | 1.76 | 1.78 | 1.82 | 1.74 | 1.72 | 1.77 | 1.88 | 1.94 | 1.98 | 1.78 |
| 1988 | 2.41 | 2.38 | 2.08 | 2.24 | 2.32 | 2.27 | 2.14 | 2.24 | 2.33 | 2.49 | 2.52 | 2.41 | 2.32 |
| 1989 | 2.12 | 2.11 | 2.17 | 2.13 | 2.16 | 2.15 | 2.23 | 2.28 | 2.20 | 2.27 | 2.27 | 2.33 | 2.20 |
| 1990 | 2.39 | 2.17 | 1.99 | 2.01 | 2.11 | 2.16 | 2.07 | 2.09 | 2.15 | 2.14 | 2.12 | 2.13 | 2.13 |
| 1991 | 2.02 | 1.89 | 1.92 | 2.08 | 2.18 | | | | | | | | |
| Oats, no. 2 heavy white, Minneapolis: | | | | | | | | | | | | | |
| 1985 | 1.59 | 1.44 | 1.23 | 1.24 | 1.19 | 1.32 | 1.39 | 1.37 | 1.30 | 1.27 | 1.16 | 1.22 | 1.31 |
| 1986 | 1.18 | 1.05 | 1.12 | 1.29 | 1.39 | 1.72 | 1.66 | 1.64 | 1.56 | 1.46 | 1.59 | 1.83 | 1.46 |
| 1987 | 1.64 | 1.61 | 1.77 | 1.85 | 1.97 | 2.05 | 2.02 | 2.10 | 2.06 | 1.93 | 1.94 | 2.12 | 1.92 |
| 1988 | 3.26 | 3.25 | 3.09 | 3.07 | 2.99 | 2.71 | 2.74 | 2.87 | 2.59 | 2.49 | 2.30 | 2.22 | 2.80 |
| 1989 | 1.97 | 1.72 | 1.59 | 1.58 | 1.61 | 1.68 | 1.70 | 1.56 | 1.48 | 1.57 | 1.63 | 1.68 | 1.65 |
| 1990 | 1.52 | 1.37 | 1.25 | 1.23 | 1.29 | 1.30 | 1.24 | 1.22 | 1.18 | 1.27 | 1.32 | 1.36 | 1.30 |
| 1991 | 1.25 | 1.33 | 1.38 | 1.35 | 1.41 | | | | | | | | |

NQ = No quotes.
1/ Rail delivered to Texas Gulf. 2/ Reporting point changed from Texas High Plains to South Panhandle starting January 1991. 3/ Prior to June 1977 reported as barley, no. 3 or better. 4/ Reporting point changed from Minneapolis #2 feed to Duluth #2 feed beginning March 1987.

Source: Grain and Feed Market News, Agricultural Marketing Service, USDA.

Appendix table 13--Feed-price ratios for livestock, poultry, and milk, by months, 1982-91

| Year | Sept. | Oct. 1/ | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hog/corn, U.S. basis 2/: | | | | | | | | | | | | | |
| 1982 | 28.50 | 28.20 | 24.60 | 23.70 | 23.40 | 21.90 | 18.60 | 15.90 | 15.10 | 14.40 | 13.90 | 13.90 | 20.17 |
| 1983 | 13.30 | 12.80 | 11.80 | 14.00 | 15.40 | 14.60 | 14.30 | 14.30 | 14.10 | 14.60 | 15.80 | 16.20 | 14.27 |
| 1984 | 16.00 | 16.50 | 18.40 | 19.00 | 18.20 | 18.40 | 16.30 | 15.30 | 15.40 | 16.90 | 17.60 | 17.40 | 17.12 |
| 1985 | 17.30 | 20.40 | 19.50 | 19.80 | 19.00 | 18.40 | 17.60 | 17.30 | 19.20 | 22.70 | 29.50 | 35.90 | 21.38 |
| 1986 | 40.20 | 37.90 | 35.90 | 33.70 | 31.90 | 33.90 | 32.20 | 33.40 | 32.80 | 35.00 | 37.30 | 39.90 | 35.34 |
| 1987 | 36.40 | 31.50 | 25.20 | 23.40 | 24.30 | 25.00 | 22.70 | 22.30 | 23.90 | 19.50 | 16.20 | 16.90 | 23.94 |
| 1988 | 15.70 | 15.00 | 14.40 | 15.70 | 15.70 | 15.60 | 15.10 | 14.40 | 16.10 | 17.90 | 18.60 | 20.10 | 16.19 |
| 1989 | 19.00 | 21.00 | 20.10 | 21.20 | 20.50 | 20.80 | 21.60 | 21.40 | 23.40 | 22.90 | 23.20 | 22.30 | 21.45 |
| 1990 | 23.40 | 25.90 | 23.20 | 21.50 | 22.00 | 22.50 | 21.50 | 21.00 | 23.40 | 23.70 | 23.80 | 22.00 | 22.83 |
| 1991 | 19.80 | 19.40 | | | | | | | | | | | |
| Beef-steer/corn, Omaha 3/: | | | | | | | | | | | | | |
| 1982 | 27.50 | 27.70 | 25.10 | 25.20 | 24.50 | 23.40 | 22.70 | 21.90 | 21.80 | 21.20 | 19.60 | 18.10 | 23.22 |
| 1983 | 17.80 | 18.40 | 18.30 | 19.80 | 21.60 | 22.10 | 21.10 | 20.40 | 19.70 | 19.10 | 20.40 | 20.70 | 19.95 |
| 1984 | 21.30 | 22.40 | 24.60 | 25.60 | 24.80 | 24.10 | 22.20 | 21.50 | 21.50 | 21.00 | 20.40 | 21.70 | 22.59 |
| 1985 | 21.80 | 25.70 | 27.80 | 26.70 | 25.60 | 24.40 | 24.00 | 22.90 | 23.00 | 22.30 | 28.90 | 36.70 | 25.82 |
| 1986 | 42.10 | 42.70 | 39.70 | 38.80 | 40.80 | 43.90 | 41.90 | 42.20 | 40.20 | 38.90 | 41.40 | 43.90 | 41.38 |
| 1987 | 42.10 | 41.40 | 38.40 | 36.70 | 36.40 | 37.40 | 38.20 | 39.40 | 38.60 | 29.50 | 24.40 | 26.10 | 35.72 |
| 1988 | 26.40 | 26.40 | 28.40 | 27.90 | 28.10 | 28.70 | 29.40 | 30.20 | 29.30 | 29.10 | 29.60 | 32.00 | 28.79 |
| 1989 | 30.80 | 31.10 | 32.20 | 32.80 | 34.20 | 34.00 | 32.60 | 31.10 | 29.30 | 27.90 | 28.50 | 30.90 | 31.28 |
| 1990 | 34.50 | 36.50 | 37.30 | 36.50 | 35.30 | 34.30 | 34.00 | 32.80 | 32.70 | 32.00 | 31.30 | 28.50 | 33.81 |
| 1991 | 28.80 | 29.90 | | | | | | | | | | | |
| Milk/feed, U.S. basis 4/: | | | | | | | | | | | | | |
| 1982 | 1.57 | 1.61 | 1.62 | 1.60 | 1.59 | 1.56 | 1.55 | 1.49 | 1.45 | 1.43 | 1.45 | 1.41 | 1.53 |
| 1983 | 1.36 | 1.39 | 1.36 | 1.34 | 1.33 | 1.33 | 1.34 | 1.32 | 1.32 | 1.32 | 1.35 | 1.40 | 1.35 |
| 1984 | 1.48 | 1.56 | 1.62 | 1.59 | 1.57 | 1.57 | 1.55 | 1.51 | 1.47 | 1.45 | 1.44 | 1.47 | 1.52 |
| 1985 | 1.51 | 1.56 | 1.55 | 1.53 | 1.48 | 1.50 | 1.48 | 1.48 | 1.46 | 1.45 | 1.51 | 1.55 | 1.51 |
| 1986 | 1.61 | 1.75 | 1.77 | 1.77 | 1.73 | 1.69 | 1.63 | 1.61 | 1.57 | 1.57 | 1.56 | 1.58 | 1.65 |
| 1987 | 1.64 | 1.65 | 1.65 | 1.63 | 1.51 | 1.47 | 1.43 | 1.40 | 1.37 | 1.36 | 1.15 | 1.19 | 1.45 |
| 1988 | 1.26 | 1.32 | 1.36 | 1.38 | 1.38 | 1.35 | 1.30 | 1.29 | 1.28 | 1.29 | 1.37 | 1.43 | 1.33 |
| 1989 | 1.52 | 1.63 | 1.71 | 1.76 | 1.67 | 1.56 | 1.49 | 1.48 | 1.49 | 1.52 | 1.55 | 1.57 | 1.58 |
| 1990 | 1.54 | 1.45 | 1.40 | 1.31 | 1.31 | 1.31 | 1.27 | 1.27 | 1.28 | 1.28 | 1.37 | 1.43 | 1.35 |
| 1991 | 1.49 | 1.50 | | | | | | | | | | | |
| Egg/feed, U.S. basis 5/: | | | | | | | | | | | | | |
| 1982 | 6.00 | 6.30 | 6.30 | 6.00 | 5.70 | 5.80 | 6.10 | 5.80 | 6.00 | 5.80 | 5.70 | 6.10 | 5.97 |
| 1983 | 6.00 | 6.20 | 6.90 | 7.70 | 8.80 | 8.50 | 7.40 | 8.50 | 6.50 | 5.80 | 5.80 | 5.80 | 6.99 |
| 1984 | 5.90 | 5.70 | 6.50 | 6.30 | 5.50 | 5.60 | 6.30 | 5.70 | 5.50 | 5.90 | 5.90 | 6.50 | 5.94 |
| 1985 | 7.10 | 7.30 | 7.50 | 7.40 | 7.20 | 6.90 | 7.60 | 6.40 | 6.40 | 5.70 | 6.90 | 7.30 | 6.98 |
| 1986 | 7.30 | 7.00 | 8.00 | 7.80 | 7.30 | 7.10 | 6.60 | 6.60 | 5.90 | 6.00 | 5.70 | 5.60 | 6.74 |
| 1987 | 6.50 | 6.00 | 6.40 | 5.70 | 5.50 | 5.30 | 5.60 | 5.20 | 5.00 | 5.30 | 4.90 | 4.90 | 5.53 |
| 1988 | 5.40 | 5.30 | 5.40 | 5.50 | 6.00 | 5.80 | 7.40 | 6.30 | 5.90 | 6.10 | 6.20 | 6.90 | 6.02 |
| 1989 | 6.80 | 7.20 | 7.90 | 8.30 | 8.40 | 7.10 | 8.00 | 7.30 | 6.20 | 6.50 | 5.60 | 6.40 | 7.14 |
| 1990 | 6.70 | 7.30 | 7.30 | 7.70 | 8.00 | 6.80 | 8.10 | 6.70 | 6.10 | 6.10 | 6.90 | 6.80 | 7.04 |
| 1991 | 6.70 | 6.40 | | | | | | | | | | | |
| Broiler/feed, U.S. basis 6/: | | | | | | | | | | | | | |
| 1982 | 2.60 | 2.50 | 2.50 | 2.50 | 2.60 | 2.70 | 2.40 | 2.30 | 2.40 | 2.60 | 2.80 | 2.80 | 2.56 |
| 1983 | 2.70 | 2.50 | 2.80 | 2.90 | 3.10 | 3.10 | 3.10 | 2.70 | 2.70 | 2.70 | 3.00 | 2.70 | 2.83 |
| 1984 | 2.80 | 2.60 | 2.80 | 2.70 | 2.90 | 2.90 | 2.80 | 2.80 | 3.10 | 3.20 | 3.10 | 3.10 | 2.90 |
| 1985 | 3.20 | 3.10 | 3.50 | 3.20 | 3.20 | 3.10 | 3.10 | 3.10 | 3.40 | 3.80 | 4.50 | 4.60 | 3.48 |
| 1986 | 3.80 | 4.40 | 3.90 | 3.40 | 3.60 | 3.50 | 3.30 | 3.20 | 3.30 | 3.00 | 2.90 | 3.30 | 3.47 |
| 1987 | 2.90 | 2.60 | 2.70 | 2.50 | 2.70 | 2.70 | 2.80 | 3.10 | 3.70 | 4.10 | 3.40 | 3.40 | 3.05 |
| 1988 | 3.20 | 2.80 | 2.70 | 2.80 | 2.80 | 2.80 | 3.10 | 3.30 | 3.70 | 3.50 | 3.30 | 3.00 | 3.08 |
| 1989 | 3.10 | 2.70 | 2.60 | 2.50 | 2.70 | 3.00 | 3.20 | 3.00 | 3.20 | 3.10 | 3.30 | 3.00 | 2.95 |
| 1990 | 3.10 | 2.70 | 2.70 | 2.70 | 2.90 | 2.80 | 2.90 | 2.90 | 3.00 | 3.00 | 3.20 | 3.20 | 2.93 |
| 1991 | 3.20 | 3.00 | | | | | | | | | | | |
| Turkey/feed, U.S. basis 7/: | | | | | | | | | | | | | |
| 1982 | 3.80 | 3.90 | 3.90 | 3.00 | 2.90 | 2.90 | 2.90 | 2.70 | 2.90 | 3.00 | 2.80 | 2.80 | 3.13 |
| 1983 | 3.00 | 3.00 | 3.10 | 3.50 | 3.60 | 3.20 | 3.30 | 3.30 | 3.30 | 3.30 | 3.60 | 3.80 | 3.33 |
| 1984 | 3.90 | 4.40 | 5.00 | 5.50 | 4.70 | 3.80 | 3.70 | 3.70 | 3.70 | 3.90 | 4.20 | 4.50 | 4.25 |
| 1985 | 5.00 | 5.50 | 5.50 | 5.50 | 3.40 | 3.40 | 3.50 | 3.50 | 3.80 | 4.30 | 4.50 | 4.60 | 4.38 |
| 1986 | 4.70 | 4.90 | 4.80 | 4.00 | 3.30 | 3.40 | 3.40 | 3.50 | 3.40 | 3.30 | 3.10 | 3.00 | 3.73 |
| 1987 | 2.90 | 2.80 | 3.10 | 3.60 | 2.90 | 2.60 | 2.50 | 2.70 | 2.80 | 3.00 | 3.00 | 3.10 | 2.92 |
| 1988 | 3.40 | 3.60 | 3.60 | 2.90 | 2.70 | 3.00 | 3.10 | 3.40 | 3.50 | 3.50 | 3.30 | 3.30 | 3.28 |
| 1989 | 2.90 | 3.10 | 3.30 | 3.20 | 3.00 | 2.80 | 3.00 | 3.10 | 3.20 | 3.20 | 3.30 | 3.40 | 3.13 |
| 1990 | 3.40 | 3.60 | 3.60 | 3.10 | 2.90 | 2.90 | 3.20 | 3.10 | 3.30 | 3.40 | 3.50 | 3.60 | 3.30 |
| 1991 | 3.50 | 3.20 | | | | | | | | | | | |

1/ October 1991 is preliminary. 2/ Bushels of corn equal in value to 100 pounds of hog, live weight. 3/ Based on price of choice beef-steers, 900-1100 pounds. 4/ Pounds of 16-percent mixed dairy feed equal in value to 1 pound whole milk. 5/ Pounds of laying feed equal in value to 1 dozen eggs. 6/ Pounds of broiler grower feed equal in value to 1 pound broiler, live weight. 7/ Pounds of turkey grower feed equal in value to 1 pound of turkey, live weight.

Sources: Agricultural Prices, Agricultural Statistics Board, USDA.
Livestock, Meat & Wool Market News, Agricultural Marketing Service, USDA.

Appendix table 14--Price trends, selected feeds, and corn products

| Item | Unit | Sept.-Aug. 1989/90 | Jan. | Fe |
|---|---|---|---|---|
| Wholesale, mostly bulk 1/: | | | | |
| Soybean meal, 44% solvent, Decatur | $/ton | 177.10 | 155.70 | 163 |
| Soybean meal, high protein, Decatur | " | 190.22 | 167.00 | 174 |
| Cottonseed meal, 41% solvent, Memphis | " | 164.25 | 125.00 | 118 |
| Linseed meal, 34% solvent, Minneapolis | " | 132.81 | 131.00 | 131 |
| Meat and bone meal, Kansas City | " | 207.29 | 198.50 | 191 |
| Fishmeal, 67% protein, East Coast | " | 358.39 | NQ | 356 |
| Corn gluten feed, Illinois pts. | " | 100.81 | 114.20 | 103 |
| Corn gluten meal, 60% protein, Illinois pts. | " | 256.57 | 247.00 | 239 |
| Brewers' dried grains, Milwaukee | " | 97.05 | 115.00 | 115 |
| Distillers' dried grains, Lawrenceburg, Indiana | " | 124.35 | 134.80 | 136 |
| Feather meal, Arkansas pts. | " | 210.01 | 207.50 | 167 |
| Wheat bran, Kansas City | " | 80.64 | 79.10 | 69 |
| Wheat middlings, Kansas City | " | 80.64 | 79.10 | 69 |
| Rice bran, f.o.b. mills, Arkansas | " | 70.83 | 75.20 | 57 |
| Hominy feed, Illinois pts. | " | 89.00 | 85.50 | 83 |
| Alfalfa meal, dehydrated, Kansas City | " | 127.00 | 112.00 | 112 |
| Cane molasses, New Orleans | " | 55.05 | 67.50 | 67 |
| Molasses beet pulp, Los Angeles | " | 118.36 | 125.00 | 125 |
| Animal fat, Kansas City | c/lb. | 10.94 | 11.60 | 11 |
| Urea, 42% nitrogen, Forth Worth | $/ton | 197.89 | 185.00 | 185 |
| Corn, no. 2 white, Kansas City | $/bu. | 2.99 | 2.95 | 2 |
| Prices paid, U.S. basis 2/ 3/: | | | | |
| Soybean meal, 44% | $/cwt | 13.53 | 12.50 | |
| Cottonseed meal, 41% | " | 14.85 | 14.60 | |
| Wheat bran | " | 10.83 | 10.70 | |
| Wheat middlings | " | 9.51 | 9.35 | |
| Broiler grower feed | $/ton | 221.25 | 211.00 | |
| Laying feed | " | 200.00 | 198.00 | |
| Turkey grower feed | " | 240.25 | 235.00 | |
| Chick starter | " | 228.50 | 217.00 | |
| Dairy feed, 16% | " | 182.50 | 179.00 | |
| Beef cattle concentrate, 32-36% protein 4/ | " | 256.25 | 249.00 | |
| Hog concentrate, 38-42% protein 4/ | " | 309.25 | 294.00 | |
| Stock salt 4/ | 50 lb | 3.46 | 3.57 | |
| Corn products, wholesale 5/: | | | | |
| Corn meal, yellow, New York | $/cwt | 13.40 | 13.51 | 1 |
| Grits (brewers'), Chicago | " | 10.21 | 9.97 | 1 |
| Syrup, Midwest/West | c/lb. | 11.39 | 10.44 | 1 |
| Sugar (dextrose), Midwest | " | 24.54 | 24.50 | 2 |
| High-fructose (dried weight in tank cars), Midwest | " | 13.90 | 12.78 | 1 |
| Corn starch, f.o b. Midwest | $/cwt | 10.66 | 10.73 | 1 |

--- = Not applicable.
NQ = No quotes.
1/ Grain and Feed Market News, Agricultural Marketing Service, USDA, exce
Minneapolis, Minnesota. 2/ Agricultural Prices, Agricultural Statistics Bo
4/ Prices previously published in cwt. 5/ Milling and Baking News, Kansas

| 1991 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. |
| 163.60 | 165.75 | 171.50 | 171.00 | 171.10 | 169.70 | 177.60 | 191.90 | 183.00 |
| 174.50 | 177.60 | 182.50 | 182.10 | 183.25 | 181.00 | 188.75 | 204.25 | 196.30 |
| 118.10 | 125.00 | 122.50 | 118.10 | 117.20 | 127.50 | 130.90 | 133.10 | 131.00 |
| 131.25 | 120.00 | 121.00 | 126.25 | 134.25 | 133.00 | 131.25 | 116.25 | 128.00 |
| 191.25 | 205.60 | 205.00 | 194.40 | 195.75 | 205.10 | 224.40 | 232.50 | 227.00 |
| 356.25 | 351.90 | 329.50 | 325.00 | 316.25 | 324.50 | 358.75 | 385.00 | 403.50 |
| 103.75 | 114.25 | 101.70 | 95.90 | 94.25 | 92.00 | 90.50 | 95.60 | 104.60 |
| 239.40 | 247.50 | 236.70 | 226.90 | 230.00 | 236.20 | 254.60 | 269.40 | 292.50 |
| 115.00 | 82.50 | 80.50 | 82.25 | 75.60 | 63.50 | 81.13 | 99.00 | 107.50 |
| 136.25 | 138.00 | 134.00 | 128.00 | 123.00 | 90.70 | NQ | 118.00 | 118.00 |
| 167.50 | 204.50 | 206.00 | 189.40 | 170.75 | 173.20 | 178.80 | 202.50 | 198.80 |
| 69.40 | 70.40 | 56.30 | 51.90 | 52.75 | 55.70 | 63.50 | 61.60 | 72.90 |
| 69.40 | 70.40 | 56.30 | 51.90 | 52.75 | 55.70 | 63.50 | 61.60 | 72.90 |
| 57.75 | 62.60 | 66.40 | 54.65 | 59.10 | 60.10 | 53.40 | 49.90 | 46.60 |
| 83.00 | 82.50 | 82.10 | 68.10 | 73.90 | 77.00 | 79.13 | 80.00 | 77.20 |
| 112.00 | 111.25 | 112.20 | 115.00 | 109.00 | 105.40 | 103.00 | 103.00 | 103.00 |
| 67.50 | 67.50 | 67.50 | 67.50 | 67.50 | 67.50 | 67.50 | 65.25 | 65.00 |
| 125.00 | 120.00 | 112.90 | 112.00 | 112.50 | 80.00 | NQ | 80.00 | 80.00 |
| 11.20 | 10.60 | 10.50 | 10.00 | 10.00 | 10.70 | 10.50 | 10.50 | 10.20 |
| 185.00 | 187.00 | 185.00 | 185.00 | 185.00 | 185.00 | 183.33 | 180.00 | 180.00 |
| 2.95 | 2.95 | 2.96 | 3.10 | 3.12 | 3.13 | 2.96 | 2.80 | 2.80 |
| --- | --- | 12.70 | --- | --- | 12.70 | --- | --- | 13.40 |
| --- | --- | 14.00 | --- | --- | 13.80 | --- | --- | 13.40 |
| --- | --- | 10.80 | --- | --- | 10.60 | --- | --- | 10.60 |
| --- | --- | 9.39 | --- | --- | 9.01 | --- | --- | 9.10 |
| --- | --- | 209.00 | --- | --- | 202.00 | --- | --- | 208.00 |
| --- | --- | 195.00 | --- | --- | 189.00 | --- | --- | 199.00 |
| --- | --- | 237.00 | --- | --- | 227.00 | --- | --- | 241.00 |
| --- | --- | 222.00 | --- | --- | 218.00 | --- | --- | 225.00 |
| --- | --- | 178.00 | --- | --- | 172.00 | --- | --- | 176.00 |
| --- | --- | 249.00 | --- | --- | 245.00 | --- | --- | 248.00 |
| --- | --- | 295.00 | --- | --- | 297.00 | --- | --- | 312.00 |
| --- | --- | 3.58 | --- | --- | 3.58 | --- | --- | 3.58 |
| 13.62 | 13.62 | 13.69 | 13.43 | 12.82 | 13.20 | 13.62 | 13.40 | 13.51 |
| 10.05 | 10.09 | 10.18 | 9.92 | 9.79 | 9.69 | 10.11 | 9.90 | 10.00 |
| 10.44 | 11.36 | 12.73 | 12.73 | 12.73 | 12.73 | 12.73 | 12.86 | 13.23 |
| 24.50 | 24.50 | 24.50 | 24.50 | 24.50 | 24.50 | 24.50 | 24.50 | 24.50 |
| 12.78 | 13.16 | 14.70 | 14.70 | 15.34 | 17.25 | 17.25 | 17.25 | 14.70 |
| 10.86 | 10.86 | 11.01 | 11.41 | 11.41 | 11.41 | 11.11 | 11.56 | 11.35 |

except urea which is from Feedstuffs, Miller Publishing Co.,
cs Board, USDA. 3/ Prices paid data is available on a quarterly basis only.
nsas City, Missouri, except starch which is from industry sources.

Appendix table 15--Corn, sorghum, barley, and oats exports, 1988/89 to date 1/

| Year and month | Corn | | Sorghum | Year and month | Barley | | Oats | |
|---|---|---|---|---|---|---|---|---|
| | Grain only | Total | | | Grain only | Total | Grain only | Total |
| | Bushels | | | | Bushels | | | |
| 1988/89: | | | | 1988/89: | | | | |
| Sept. | 150,843,842 | 151,736,284 | 26,656,522 | June | 12,108,210 | 12,402,962 | 102,245 | 258,289 |
| Oct. | 170,295,536 | 171,523,785 | 19,499,969 | July | 11,513,586 | 11,757,762 | 38,739 | 88,239 |
| Nov. | 149,632,839 | 151,030,488 | 18,319,440 | Aug. | 2,214,904 | 2,500,232 | 24,394 | 145,962 |
| 1st Qtr. | 470,772,217 | 474,290,557 | 64,475,931 | 1st Qtr. | 25,836,700 | 26,660,956 | 165,378 | 492,490 |
| Dec. | 172,492,326 | 173,546,904 | 27,975,619 | Sept. | 8,758,198 | 8,833,519 | 21,017 | 90,049 |
| Jan. | 175,221,513 | 176,487,573 | 32,501,841 | Oct. | 1,432,089 | 2,161,176 | 30,378 | 57,096 |
| Feb. | 154,909,994 | 158,177,973 | 33,002,703 | Nov. | 2,452,268 | 3,055,490 | 73,371 | 126,759 |
| 2nd Qtr. | 502,623,833 | 508,212,450 | 93,480,163 | 2nd Qtr. | 12,642,555 | 14,050,185 | 124,766 | 273,904 |
| Mar. | 202,840,169 | 206,563,860 | 30,648,140 | Dec. | 15,121,435 | 15,440,102 | 29,605 | 51,848 |
| Apr. | 177,475,933 | 180,898,856 | 28,248,011 | Jan. | 84,517 | 417,785 | 115,957 | 154,015 |
| May | 211,303,127 | 212,764,901 | 21,239,060 | Feb. | 81,490 | 439,958 | 65,245 | 112,585 |
| 3rd Qtr. | 591,619,229 | 600,227,617 | 80,135,211 | 3rd Qtr. | 15,287,442 | 16,297,845 | 210,807 | 318,448 |
| June | 223,487,607 | 225,359,132 | 24,105,107 | Mar. | 1,964,297 | 2,424,381 | 22,487 | 70,294 |
| July | 133,145,813 | 135,157,047 | 25,119,434 | Apr. | 13,817,421 | 14,373,832 | 27,765 | 69,774 |
| Aug. | 106,804,440 | 109,287,340 | 22,869,115 | May | 9,781,368 | 10,571,462 | 27,121 | 60,581 |
| 4th Qtr. | 463,437,860 | 469,803,519 | 72,093,656 | 4th Qtr. | 25,563,086 | 27,369,675 | 77,373 | 200,649 |
| Total | 2,028,453,139 | 2,052,534,142 | 310,184,961 | Total | 79,329,783 | 84,378,661 | 578,324 | 1,285,491 |
| 1989/90: | | | | 1989/90: | | | | |
| Sept. | 113,776,974 | 116,262,446 | 34,171,231 | June | 7,364,654 | 8,121,974 | 73,555 | 134,619 |
| Oct. | 175,531,175 | 178,434,620 | 33,729,330 | July | 9,666,205 | 10,690,552 | 99,550 | 154,363 |
| Nov. | 293,764,931 | 296,074,486 | 22,408,755 | Aug. | 9,513,210 | 9,987,091 | 56,400 | 181,747 |
| 1st Qtr. | 583,073,080 | 590,771,552 | 90,309,316 | 1st Qtr. | 26,544,069 | 28,799,617 | 229,505 | 470,729 |
| Dec. | 258,806,792 | 260,538,272 | 19,612,697 | Sept. | 8,060,139 | 9,274,483 | 137,368 | 245,862 |
| Jan. | 239,115,226 | 241,832,437 | 33,378,612 | Oct. | 4,634,063 | 5,354,195 | 86,668 | 183,582 |
| Feb. | 183,848,421 | 186,811,227 | 28,182,429 | Nov. | 4,520,961 | 5,397,789 | 46,922 | 103,742 |
| 2nd Qtr. | 681,770,439 | 689,181,936 | 81,173,738 | 2nd Qtr. | 17,215,163 | 20,026,467 | 270,958 | 533,186 |
| Mar. | 193,266,890 | 196,494,682 | 31,489,112 | Dec. | 9,910,349 | 10,568,654 | 55,999 | 83,079 |
| Apr. | 193,839,027 | 198,739,081 | 27,544,536 | Jan. | 6,037,587 | 6,879,444 | 59,397 | 93,083 |
| May | 214,184,922 | 216,778,666 | 22,232,389 | Feb. | 6,895,254 | 7,088,782 | 36,769 | 65,525 |
| 3rd Qtr. | 601,290,839 | 612,012,429 | 81,266,037 | 3rd Qtr. | 22,843,190 | 24,536,880 | 152,165 | 241,687 |
| June | 201,188,588 | 204,096,201 | 12,501,897 | Mar. | 566,367 | 800,696 | 66,607 | 102,001 |
| July | 147,757,179 | 150,908,438 | 14,517,610 | Apr. | 8,399,072 | 9,812,500 | 72,009 | 110,947 |
| Aug. | 153,686,452 | 157,627,664 | 23,760,673 | May | 8,907,697 | 9,086,501 | 32,389 | 63,663 |
| 4th Qtr. | 502,632,219 | 512,632,303 | 50,780,180 | 4th Qtr. | 17,873,136 | 19,699,697 | 171,005 | 276,611 |
| Total | 2,368,766,577 | 2,404,598,220 | 303,529,271 | Total | 84,475,558 | 93,062,661 | 823,633 | 1,522,213 |
| 1990/91: | | | | 1990/91: | | | | |
| Sept. | 106,371,404 | 109,121,558 | 18,212,586 | June | 11,117,511 | 11,513,895 | 97,249 | 1,570,662 |
| Oct. | 108,167,144 | 111,184,494 | 17,699,762 | July | 9,710,720 | 10,087,119 | 40,805 | 85,623 |
| Nov. | 168,266,952 | 171,556,193 | 20,675,429 | Aug. | 10,034,339 | 10,539,636 | 44,949 | 110,455 |
| 1st Qtr. | 382,805,500 | 391,862,245 | 56,587,777 | 1st Qtr. | 30,862,570 | 32,140,650 | 183,003 | 1,766,740 |
| Dec. | 142,014,881 | 144,250,941 | 17,623,359 | Sept. | 1,988,455 | 3,087,526 | 126,235 | 169,601 |
| Jan. | 145,445,877 | 149,685,134 | 16,917,475 | Oct. | 14,220,343 | 14,670,656 | 60,209 | 128,694 |
| Feb. | 183,208,638 | 188,165,991 | 26,675,128 | Nov. | 9,147,225 | 9,386,411 | 44,661 | 114,089 |
| 2nd Qtr. | 470,669,396 | 482,102,066 | 61,215,962 | 2nd Qtr. | 25,356,023 | 27,144,593 | 231,105 | 412,384 |
| Mar. | 188,981,321 | 192,970,486 | 29,896,631 | Dec. | 12,191,762 | 13,433,856 | 16,252 | 72,260 |
| Apr. | 144,273,052 | 146,807,504 | 30,388,649 | Jan. | 5,306,015 | 5,997,143 | 56,190 | 123,333 |
| May | 120,483,217 | 125,189,783 | 16,532,755 | Feb. | 1,139,882 | 1,508,113 | 21,875 | 87,282 |
| 3rd Qtr. | 453,737,590 | 464,967,773 | 76,818,035 | 3rd Qtr. | 18,637,659 | 20,939,112 | 94,317 | 282,875 |
| June | 105,294,851 | 108,118,121 | 4,063,117 | Mar. | 2,150,913 | 2,944,676 | 23,608 | 2,293,189 |
| July | 163,730,027 | 169,515,240 | 14,562,929 | Apr. | 438,667 | 1,083,195 | 40,473 | 183,233 |
| Aug. | 150,396,445 | 153,879,355 | 19,554,532 | May | 2,435,385 | 3,739,709 | 38,181 | 136,823 |
| 4th Qtr. | 419,419,323 | 431,512,716 | 38,180,578 | 4th Qtr. | 5,024,965 | 7,767,580 | 102,262 | 2,613,245 |
| Total | 1,726,631,809 | 1,770,444,800 | 232,802,352 | Total | 79,881,217 | 87,991,935 | 610,687 | 5,075,244 |
| 1991/92: | | | | 1991/92: | | | | |
| Sept. | 134,579,575 | 137,427,301 | 14,660,649 | June | 695,827 | 1,328,726 | 58,438 | 121,591 |
| Oct. | | | | July | 5,394,267 | 6,485,164 | 53,051 | 149,437 |
| Nov. | | | | Aug. | 7,408,530 | 8,107,336 | 22,994 | 99,641 |
| 1st Qtr. | | | | 1st Qtr. | 13,498,624 | 15,921,226 | 134,483 | 370,669 |
| Dec. | | | | Sept. | 8,692,162 | 9,507,942 | 84,580 | 170,240 |

1/ Total corn exports include grain only (white, yellow, seed, relief), dry process (cornmeal for relief, as grain, grits), and wet process (corn starch, sugar dextrose, glucose, high fructose). Sorghum includes seed and unmilled. Barley includes grain only (grain for malting purposes, other) and barley malt. Oats include grain and oatmeal (bulk and packaged).

Source: Bureau of the Census, U.S. Department of Commerce.

Appendix table 16--Corn, sorghum, barley, and oats imports, 1988/89 to date 1/

| Year and month | Corn | | Sorghum | Year and month | Barley | | Oats | |
|---|---|---|---|---|---|---|---|---|
| | Grain only | Total | | | Grain only | Total | Grain only | Total |
| | Bushels | | | | Bushels | | | |
| 1988/89: | | | | 1988/89: | | | | |
| Sept. | 148,437 | 177,913 | 0 | June | 1,596,106 | 1,700,185 | 5,680,015 | 5,772,502 |
| Oct. | 296,701 | 308,058 | 3,673 | July | 930,207 | 1,029,127 | 2,276,583 | 2,365,501 |
| Nov. | 180,789 | 233,514 | 0 | Aug. | 317,223 | 417,363 | 4,298,356 | 4,485,006 |
| 1st Qtr. | 625,927 | 719,485 | 3,673 | 1st Qtr. | 2,843,536 | 3,146,675 | 12,254,954 | 12,623,009 |
| Dec. | 106,151 | 173,241 | 0 | Sept. | 240,729 | 365,319 | 2,059,442 | 2,367,645 |
| Jan. | 307,023 | 723,699 | 0 | Oct. | 402,245 | 555,196 | 3,995,388 | 4,239,340 |
| Feb. | 178,260 | 591,385 | 15,130 | Nov. | 1,523,621 | 1,651,752 | 5,834,991 | 6,184,617 |
| 2nd Qtr. | 591,434 | 1,488,325 | 15,130 | 2nd Qtr. | 2,166,595 | 2,572,267 | 11,889,821 | 12,791,602 |
| Mar. | 420,381 | 742,935 | 0 | Dec. | 490,420 | 578,085 | 4,696,591 | 5,153,441 |
| Apr. | 633,060 | 845,387 | 5 | Jan. | 729,443 | 838,489 | 6,100,483 | 6,906,243 |
| May | 162,021 | 356,329 | 0 | Feb. | 1,627,551 | 1,720,819 | 9,313,487 | 10,172,629 |
| 3rd Qtr. | 1,215,462 | 1,944,651 | 5 | 3rd Qtr. | 2,847,414 | 3,137,393 | 20,110,561 | 22,232,313 |
| June | 33,363 | 212,637 | 14 | Mar. | 762,924 | 851,359 | 7,169,256 | 8,042,377 |
| July | 223,459 | 382,968 | 0 | Apr. | 753,742 | 857,654 | 4,750,564 | 5,431,135 |
| Aug. | 93,469 | 348,056 | 0 | May | 1,136,714 | 1,239,385 | 6,723,912 | 7,307,316 |
| 4th Qtr. | 350,291 | 943,661 | 14 | 4th Qtr. | 2,653,380 | 2,948,398 | 18,643,732 | 20,780,828 |
| Total | 2,783,114 | 5,096,122 | 18,822 | Total | 10,510,925 | 11,804,733 | 62,899,068 | 68,427,752 |
| 1989/90: | | | | 1989/90: | | | | |
| Sept. | 38,078 | 278,865 | 0 | June | 1,649,125 | 1,745,195 | 3,146,832 | 3,789,238 |
| Oct. | 307,119 | 553,242 | 0 | July | 571,185 | 661,468 | 6,440,929 | 6,730,677 |
| Nov. | 297,019 | 545,010 | 0 | Aug. | 1,356,499 | 1,456,086 | 7,372,277 | 7,823,880 |
| 1st Qtr. | 642,216 | 1,377,117 | 0 | 1st Qtr. | 3,576,809 | 3,862,749 | 16,960,038 | 18,343,795 |
| Dec. | 98,067 | 284,277 | 0 | Sept. | 263,515 | 360,996 | 5,871,691 | 6,236,194 |
| Jan. | 247,828 | 427,823 | 0 | Oct. | 204,334 | 283,661 | 4,460,867 | 4,779,170 |
| Feb. | 92,762 | 248,372 | 0 | Nov. | 1,517,596 | 1,674,049 | 7,146,334 | 7,452,067 |
| 2nd Qtr. | 438,657 | 960,472 | 0 | 2nd Qtr. | 1,985,445 | 2,318,706 | 17,478,892 | 18,467,431 |
| Mar. | 182,222 | 320,108 | 74,979 | Dec. | 1,078,994 | 1,235,670 | 6,581,569 | 6,720,624 |
| Apr. | 162,070 | 340,157 | 826 | Jan. | 823,485 | 951,218 | 4,913,651 | 5,106,850 |
| May | 275,032 | 540,454 | 42,236 | Feb. | 1,396,491 | 1,556,043 | 4,198,054 | 4,343,569 |
| 3rd Qtr. | 619,324 | 1,200,719 | 118,041 | 3rd Qtr. | 3,298,970 | 3,742,931 | 15,693,274 | 16,171,043 |
| June | 33,491 | 302,083 | 23,864 | Mar. | 1,412,309 | 1,513,346 | 3,990,713 | 4,076,976 |
| July | 135,597 | 409,747 | 75,398 | Apr. | 1,333,963 | 1,417,784 | 8,366,698 | 8,475,874 |
| Aug. | 32,720 | 259,866 | 8,410 | May | 1,468,205 | 1,585,804 | 3,318,193 | 3,416,974 |
| 4th Qtr. | 201,808 | 971,696 | 107,672 | 4th Qtr. | 4,214,477 | 4,516,934 | 15,675,604 | 15,969,824 |
| Total | 1,902,005 | 4,510,004 | 225,713 | Total | 13,075,701 | 14,441,320 | 65,807,808 | 68,952,093 |
| 1990/91: | | | | 1990/91: | | | | |
| Sept. | 29,118 | 260,345 | 5,551 | June | 603,614 | 691,947 | 6,675,422 | 6,766,369 |
| Oct. | 172,220 | 496,429 | 0 | July | 309,116 | 547,246 | 5,841,249 | 5,908,451 |
| Nov. | 683,773 | 920,527 | 60 | Aug. | 117,460 | 357,140 | 4,998,143 | 5,090,611 |
| 1st Qtr. | 885,111 | 1,677,301 | 5,611 | 1st Qtr. | 1,030,190 | 1,596,333 | 17,514,814 | 17,765,431 |
| Dec. | 90,489 | 263,269 | 0 | Sept. | 117,510 | 200,053 | 2,240,097 | 2,358,047 |
| Jan. | 100,811 | 305,895 | 0 | Oct. | 293,888 | 485,842 | 4,464,410 | 4,636,239 |
| Feb. | 83,751 | 264,812 | 0 | Nov. | 839,438 | 1,014,543 | 4,970,603 | 5,078,808 |
| 2nd Qtr. | 275,051 | 833,976 | 0 | 2nd Qtr. | 1,250,836 | 1,700,438 | 11,675,110 | 12,073,094 |
| Mar. | 80,937 | 251,187 | 60,462 | Dec. | 1,288,335 | 1,569,231 | 6,027,830 | 6,118,040 |
| Apr. | 214,595 | 370,354 | 167 | Jan. | 1,194,977 | 1,306,682 | 2,543,485 | 2,642,746 |
| May | 975,096 | 1,295,004 | 24 | Feb. | 1,723,635 | 1,836,340 | 9,675,744 | 9,822,449 |
| 3rd Qtr. | 1,270,628 | 1,916,545 | 60,653 | 3rd Qtr. | 4,206,947 | 4,712,253 | 18,247,059 | 18,583,235 |
| June | 155,046 | 327,612 | 0 | Mar. | 2,248,034 | 2,423,555 | 4,618,596 | 4,763,254 |
| July | 423,345 | 640,317 | 679 | Apr. | 3,369,631 | 3,401,987 | 3,767,262 | 3,887,601 |
| Aug. | 893,816 | 1,121,419 | 1,319 | May | 2,747,783 | 3,163,998 | 15,171,967 | 15,438,588 |
| 4th Qtr. | 1,472,207 | 2,089,348 | 1,998 | 4th Qtr. | 8,365,448 | 8,989,540 | 23,557,825 | 24,089,443 |
| Total | 3,902,997 | 6,517,170 | 68,262 | Total | 14,853,421 | 16,998,564 | 70,994,808 | 72,511,203 |
| 1991/92: | | | | 1991/92: | | | | |
| Sept. | 1,100,354 | 1,359,676 | 0 | June | 4,575,522 | 4,778,394 | 5,759,634 | 5,844,622 |
| Oct. | | | | July | 1,743,996 | 1,919,668 | 7,175,340 | 7,240,484 |
| Nov. | | | | Aug. | 1,120,846 | 1,279,512 | 8,780,737 | 8,871,528 |
| 1st Qtr. | | | | 1st Qtr. | 7,440,364 | 7,977,574 | 21,715,711 | 21,956,634 |
| Dec. | | | | Sept. | 567,099 | 652,111 | 4,958,443 | 5,041,886 |

1/ Total includes in addition to grain, processed products of corn, barley and oats.

Source: Bureau of the Census, U.S. Department of Commerce.

Appendix table 17--Hay (all): Acreage, supply, and disappearance, 1984/85-1991/92

| Item | Unit | 1984/85 | 1985/86 | 1986/87 | 1987/88 | 1988/89 | 1989/90 | 1990/91 | 1991/92 |
|---|---|---|---|---|---|---|---|---|---|
| Acreage harvested | Mil. acres | 61.4 | 60.4 | 62.4 | 60.1 | 65.1 | 63.3 | 61.6 | 63.1 |
| Yield per acre | Tons | 2.45 | 2.46 | 2.49 | 2.45 | 1.94 | 2.30 | 2.39 | 2.5 |
| Carryover (May 1) | Mil. tons | 20.1 | 26.9 | 26.7 | 32.3 | 27.1 | 17.5 | 27.1 | 27.1 |
| Production | " | 150.6 | 148.6 | 155.5 | 147.5 | 126.0 | 145.5 | 147.0 | 158.4 |
| Supply | " | 170.7 | 175.5 | 182.2 | 179.8 | 153.1 | 163.0 | 174.1 | 185.5 |
| Disappearance | " | 143.8 | 148.8 | 149.9 | 152.7 | 135.6 | 135.9 | 147.0 | NA |
| Roughage-consuming animal units (RCAU's) | Mil. units | 83.2 | 80.5 | 78.3 | 76.3 | 75.5 | 75.5 | 75.8 | 78.8 |
| Supply per RCAU | Tons | 2.05 | 2.18 | 2.33 | 2.36 | 2.03 | 2.16 | 2.30 | 2.4 |
| Disappearance per RCAU | " | 1.73 | 1.85 | 1.91 | 2.00 | 1.80 | 1.80 | 1.94 | NA |

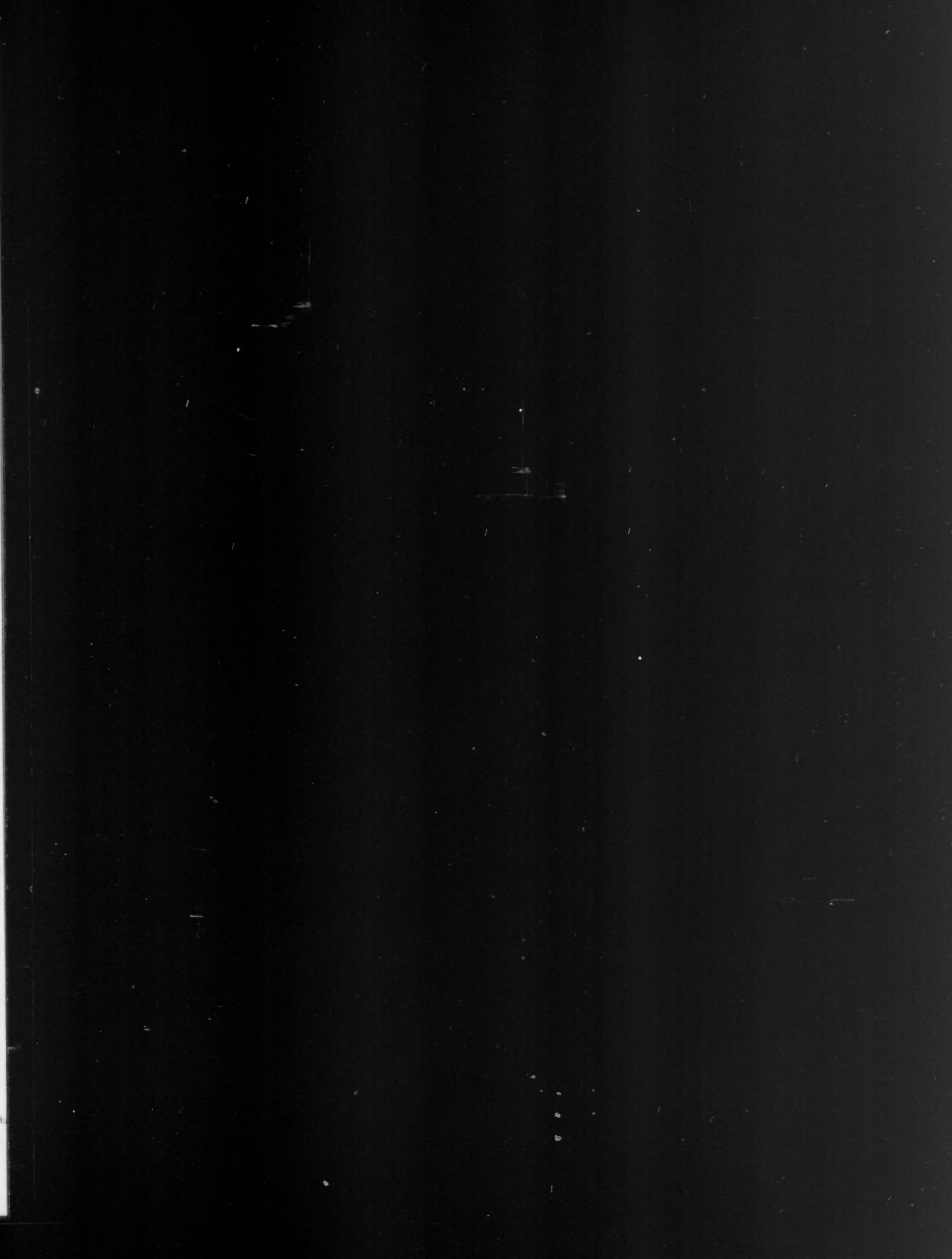
NA = Not available.

Appendix table 18--Hay: Average prices received by farmers, United States by months, 1983/84-1991/92 1/

| Year | May | June | July | Aug. | Sept. | Oct. 2/ | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | Average 3/ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $/ton | | | | | | | |
| Alfalfa: | | | | | | | | | | | | | |
| 1983/84 | 83.80 | 78.30 | 77.40 | 77.40 | 79.10 | 82.40 | 80.10 | 81.70 | 82.00 | 85.10 | 84.40 | 84.30 | 81.33 |
| 1984/85 | 87.10 | 80.10 | 75.60 | 72.80 | 73.90 | 76.70 | 74.30 | 77.50 | 76.20 | 76.40 | 75.80 | 76.70 | 76.93 |
| 1985/86 | 85.50 | 74.90 | 72.50 | 68.10 | 70.70 | 70.50 | 67.70 | 69.10 | 70.20 | 71.30 | 72.00 | 69.80 | 71.86 |
| 1986/87 | 69.50 | 64.10 | 61.40 | 60.10 | 58.80 | 59.90 | 57.90 | 60.70 | 58.80 | 61.10 | 62.80 | 67.90 | 61.92 |
| 1987/88 | 76.30 | 66.90 | 65.10 | 66.30 | 67.60 | 67.70 | 63.70 | 67.40 | 66.50 | 69.60 | 72.50 | 76.90 | 69.31 |
| 1988/89 | 84.50 | 81.90 | 87.90 | 86.10 | 87.30 | 90.30 | 92.20 | 94.40 | 96.70 | 99.40 | 105.00 | 107.00 | 93.83 |
| 1989/90 | 105.00 | 96.50 | 89.90 | 87.50 | 91.20 | 89.80 | 91.30 | 92.50 | 93.30 | 95.20 | 96.70 | 103.00 | 93.80 |
| 1990/91 | 108.00 | 95.30 | 91.70 | 89.30 | 91.60 | 92.70 | 86.60 | 85.50 | 88.10 | 87.30 | 90.40 | 93.40 | 89.20 |
| 1991/92 | 89.00 | 80.10 | 75.20 | 74.70 | 72.10 | 71.90 | | | | | | | |
| Other hay: | | | | | | | | | | | | | |
| 1983/84 | 58.90 | 56.10 | 54.30 | 52.90 | 57.80 | 59.50 | 62.10 | 64.30 | 63.30 | 63.80 | 64.90 | 66.50 | 60.37 |
| 1984/85 | 64.90 | 63.40 | 61.80 | 60.90 | 62.40 | 62.00 | 62.60 | 64.80 | 64.80 | 64.70 | 61.70 | 58.40 | 62.70 |
| 1985/86 | 58.70 | 54.00 | 57.00 | 58.40 | 58.60 | 58.20 | 55.30 | 56.00 | 56.10 | 56.00 | 54.80 | 54.90 | 56.50 |
| 1986/87 | 54.00 | 50.90 | 50.00 | 51.00 | 52.70 | 50.00 | 49.70 | 49.40 | 48.10 | 50.90 | 48.30 | 48.20 | 50.27 |
| 1987/88 | 51.90 | 50.80 | 49.60 | 51.00 | 51.80 | 51.10 | 52.30 | 51.10 | 52.20 | 51.50 | 51.70 | 51.90 | 52.09 |
| 1988/89 | 59.30 | 62.00 | 65.10 | 68.10 | 68.90 | 69.00 | 70.00 | 69.50 | 70.00 | 72.10 | 73.60 | 76.70 | 70.03 |
| 1989/90 | 78.80 | 69.00 | 63.60 | 63.10 | 66.10 | 62.80 | 63.00 | 63.00 | 64.00 | 62.50 | 63.70 | 65.10 | 65.50 |
| 1990/91 | 67.80 | 62.90 | 64.40 | 65.30 | 66.50 | 65.30 | 65.40 | 62.90 | 63.70 | 60.80 | 60.80 | 61.50 | 65.10 |
| 1991/92 | 61.10 | 57.50 | 55.80 | 60.00 | 56.60 | 58.60 | | | | | | | |
| All hay: | | | | | | | | | | | | | |
| 1983/84 | 78.10 | 72.70 | 71.20 | 71.20 | 74.70 | 76.80 | 75.10 | 76.70 | 76.60 | 78.70 | 79.40 | 79.80 | 75.80 |
| 1984/85 | 82.50 | 76.10 | 72.40 | 70.40 | 70.70 | 73.10 | 71.40 | 73.40 | 73.00 | 73.10 | 72.20 | 72.50 | 72.70 |
| 1985/86 | 80.80 | 70.20 | 67.90 | 65.20 | 67.10 | 67.50 | 64.30 | 65.40 | 65.80 | 66.70 | 67.10 | 66.20 | 67.60 |
| 1986/87 | 66.70 | 61.00 | 58.80 | 58.20 | 57.60 | 57.90 | 56.00 | 57.70 | 56.10 | 58.50 | 59.20 | 64.10 | 59.80 |
| 1987/88 | 71.70 | 62.90 | 61.20 | 62.70 | 64.10 | 64.20 | 61.10 | 63.20 | 62.80 | 64.60 | 67.20 | 71.40 | 65.00 |
| 1988/89 | 79.70 | 77.00 | 81.60 | 81.40 | 82.90 | 85.10 | 86.40 | 87.60 | 89.50 | 91.80 | 96.90 | 101.00 | 85.20 |
| 1989/90 | 100.00 | 90.20 | 83.40 | 81.60 | 85.70 | 83.20 | 83.20 | 83.50 | 84.90 | 85.70 | 87.50 | 95.00 | 85.40 |
| 1990/91 | 99.90 | 86.70 | 83.60 | 83.40 | 86.20 | 85.60 | 81.40 | 79.50 | 82.00 | 80.40 | 84.50 | 88.60 | 83.20 |
| 1991/92 | 84.20 | 71.60 | 70.60 | 71.50 | 68.10 | 68.80 | | | | | | | |

1/ Revised prices reported for mid-month. 2/ October 1991 data is preliminary. 3/ U.S. season average prices weighted by monthly marketings.

Source: Agricultural Prices, Agricultural Statistics Board, USDA.



Appendix table 19--Shipments of grain on the Illinois Waterway and the Mississi

| Crop year | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. |
|---|---|---|---|---|---|---|
| 1981/82 | 3.4 | 3.4 | 4.6 | 3.9 | 1.2 | 0.8 |
| 1982/83 | 4.1 | 3.2 | 4.2 | 3.2 | 2.7 | 2.3 |
| 1983/84 | 5.3 | 4.9 | 5.7 | 4.4 | 1.0 | 3.6 |
| 1984/85 | 3.1 | 4.6 | 5.5 | 3.1 | 2.0 | 0.9 |
| 1985/86 | 2.4 | 2.6 | 4.3 | 3.3 | 1.8 | 1.7 |
| 1986/87 | 3.2 | 3.1 | 5.2 | 2.4 | 1.2 | 1.7 |
| 1987/88 | 3.3 | 3.8 | 3.9 | 2.9 | 1.9 | 2.0 |
| 1988/89 | 3.3 | 3.3 | 3.9 | 3.5 | 1.7 | 1.5 |
| 1989/90 | 3.0 | 3.9 | 4.7 | 2.5 | 2.2 | 2.2 |
| 1990/91 | 3.6 | 3.4 | 4.8 | 2.1 | 1.6 | 2.0 |
| 1991/92 | 3.3 | 3.5 | | | | |

1/ Average of the months reported to date.

Source: Mississippi River Barge Traffic, U.S. Army Corps of Engineers, Rock

Appendix table 20--Barge rates for grain shipments to New Orleans, Louisiana 1

| Crop year | Origin | Sept. | Oct. | Nov. | Dec. | Jan. |
|---|---|---|---|---|---|---|
| 1984/85 | Peoria, IL | 7.77 | 8.07 | 6.71 | 5.79 | 7.34 |
| | St Louis, MO | 5.94 | 5.92 | 5.15 | 3.98 | 4.36 |
| 1985/86 | Peoria, IL | 5.26 | 7.93 | 6.48 | 9.08 | 7.22 |
| | St Louis, MO | 4.32 | 6.42 | 4.80 | 5.35 | 4.39 |
| 1986/87 | Peoria, IL | 8.37 | 10.54 | 6.64 | 5.16 | 4.95 |
| | St Louis, MO | 6.52 | 7.52 | 5.06 | 3.62 | 3.28 |
| 1987/88 | Peoria, IL | 8.66 | 9.04 | 7.38 | 5.68 | 7.32 |
| | St Louis, MO | 6.58 | 6.97 | 5.73 | 4.29 | 4.39 |
| 1988/89 | Peoria, IL | 9.80 | 10.32 | 7.88 | 8.81 | 7.32 |
| | St Louis, MO | 7.91 | 8.35 | 5.94 | 6.11 | 5.19 |
| 1989/90 | Peoria, IL | 5.89 | 10.49 | 10.87 | 12.15 | 9.13 |
| | St Louis, MO | 4.64 | 7.90 | 6.84 | 7.05 | 5.23 |
| 1990/91 | Peoria, IL | 6.33 | 7.38 | 7.16 | 5.97 | 7.46 |
| | St Louis, MO | 4.76 | 5.57 | 5.62 | 4.21 | 4.89 |
| 1991/92 | Peoria, IL | 10.87 | 10.67 | | | |
| | St Louis, MO | 8.22 | 8.43 | | | |

1/ Assumes all traffic on the Illinois River originates at Peoria. 2/ Avera

Source: Based on rates reported by Transportation Situation, Illinois Dept.

sissippi River (Locks 11-22), 1981/82-1991/92

| Feb. | Mar. | Apr. | May | June | July | Aug. | Average |
|---|---|---|---|---|---|---|---|
| Million tons | | | | | | | |
| 0.8 | 2.1 | 4.1 | 3.8 | 4.4 | 3.9 | 5.0 | 3.4 |
| 2.3 | 3.8 | 3.3 | 3.9 | 4.2 | 4.2 | 4.8 | 3.6 |
| 3.6 | 4.5 | 5.3 | 4.4 | 3.7 | 3.4 | 3.3 | 4.1 |
| 0.9 | 3.1 | 4.1 | 3.1 | 3.2 | 3.4 | 3.0 | 3.3 |
| 1.7 | 2.9 | 3.4 | 3.6 | 3.2 | 2.5 | 3.3 | 2.9 |
| 1.7 | 3.6 | 3.8 | 4.0 | 3.8 | 2.8 | 3.5 | 3.2 |
| 2.0 | 3.0 | 4.2 | 4.3 | 3.6 | 2.7 | 3.3 | 3.2 |
| 1.5 | 2.6 | 3.5 | 4.3 | 4.1 | 3.9 | 3.4 | 3.3 |
| 2.2 | 3.5 | 4.5 | 5.2 | 4.5 | 5.0 | 4.0 | 3.8 |
| 2.0 | 3.1 | 4.0 | 3.7 | 3.6 | 4.4 | 3.8 | 3.4 |
| | | | | | | | 1/ 3.4 |

Rock Island District.

ana 1/

| . | Feb. | Mar. | Apr. | May | June | July | Aug. | Average |
|---|---|---|---|---|---|---|---|---|
| | Dollars/ton | | | | | | | |
| 4 | 6.87 | 5.73 | 5.08 | 4.33 | 4.76 | 4.83 | 4.63 | 5.99 |
| 6 | 4.20 | 3.88 | 3.79 | 3.29 | 3.39 | 3.34 | 3.64 | 4.24 |
| 2 | 5.64 | 4.28 | 4.13 | 3.90 | 3.70 | 3.70 | 6.21 | 5.63 |
| 9 | 3.87 | 3.18 | 3.14 | 2.97 | 2.99 | 2.96 | 4.62 | 4.08 |
| 5 | 5.23 | 6.96 | 5.88 | 5.44 | 6.16 | 6.15 | 6.46 | 6.50 |
| 8 | 3.52 | 5.27 | 4.54 | 3.77 | 4.30 | 4.37 | 4.99 | 4.73 |
| 2 | 6.89 | 8.16 | 7.25 | 6.19 | 9.86 | 9.79 | 7.61 | 7.82 |
| 9 | 4.59 | 6.13 | 5.47 | 4.65 | 7.56 | 6.81 | 6.46 | 5.80 |
| 2 | 7.26 | 7.08 | 5.85 | 5.34 | 6.13 | 4.92 | 5.13 | 7.15 |
| 9 | 5.31 | 5.40 | 4.18 | 3.72 | 4.44 | 3.68 | 3.92 | 5.35 |
| 3 | 7.32 | 6.43 | 7.70 | 6.43 | 5.47 | 4.56 | 5.40 | 7.65 |
| 3 | 5.07 | 4.92 | 5.64 | 4.82 | 3.99 | 3.22 | 3.96 | 5.27 |
| 6 | 6.45 | 5.09 | 5.28 | 4.85 | 5.62 | 6.65 | 7.98 | 6.35 |
| 9 | 4.20 | 3.91 | 3.88 | 3.44 | 4.11 | 4.90 | 6.24 | 4.65 |
| | | | | | | | | 2/ 10.77 |
| | | | | | | | | 2/ 8.32 |

Average of the months reported to date.

ept. of Agriculture.

Appendix table 21--Weekly average of rail car loadings of grain and soybea

| Year | Sept. | Oct. | Nov. | Dec. | Jan. | Feb |
|---|---|---|---|---|---|---|
| | | | | | | C |
| 1979/80 | 28,576 | 32,118 | 32,558 | 30,500 | 30,504 | 31,0 |
| 1980/81 | 32,127 | 24,114 | 31,450 | 28,106 | 34,396 | 31,1 |
| 1981/82 | 25,607 | 25,609 | 27,419 | 22,384 | 22,967 | 27,2 |
| 1982/83 | 20,321 | 29,523 | 25,350 | 21,888 | 24,700 | 26,3 |
| 1983/84 | 29,735 | 31,414 | 29,515 | 25,927 | 31,068 | 29,1 |
| 1984/85 | 29,162 | 24,482 | 28,587 | 25,441 | 25,310 | 23,6 |
| 1985/86 | 18,889 | 26,227 | 28,214 | 23,482 | 25,424 | 22,5 |
| 1986/87 | 27,329 | 33,605 | 29,877 | 24,827 | 23,086 | 26,6 |
| 1987/88 | 32,977 | 32,820 | 29,947 | 29,225 | 32,223 | 34,2 |
| 1988/89 | 29,014 | 30,628 | 27,140 | 27,120 | 30,324 | 30,5 |
| 1989/90 | 24,437 | 28,950 | 31,701 | 29,411 | 32,250 | 32,6 |
| 1990/91 | 23,982 | 27,622 | 27,243 | 24,359 | 26,525 | 28,5 |
| 1991/92 | 27,454 | 30,136 | | | | |

1/ Average of the months reported to date.

Source: Association of American Railroads.

Appendix table 22--Rail freight rate index for grain, crop years 1979/80-

| Year | Sept. | Oct. | Nov. | Dec. | Jan. | Fe |
|---|---|---|---|---|---|---|
| | | | | | | D |
| 1979/80 | 64.2 | 69.5 | 69.6 | 70.2 | 70.2 | 7 |
| 1980/81 | 78.3 | 78.8 | 78.8 | 79.2 | 83.1 | 8 |
| 1981/82 | 88.5 | 89.4 | 89.4 | 89.4 | 93.6 | 9 |
| 1982/83 | 93.0 | 93.0 | 93.0 | 93.0 | 93.9 | 9 |
| 1983/84 | 93.9 | 94.2 | 94.2 | 94.2 | 98.0 | 9 |
| 1984/85 | 98.4 | 100.0 | 100.0 | 100.0 | 100.0 | 10 |
| 1985/86 | 98.0 | 98.0 | 98.0 | 98.0 | 98.9 | 9 |
| 1986/87 | 99.2 | 98.5 | 98.5 | 97.8 | 98.3 | 9 |
| 1987/88 | 98.9 | 99.2 | 99.1 | 98.5 | 101.2 | 10 |
| 1988/89 | 109.3 | 108.3 | 108.5 | 108.2 | 109.2 | 10 |
| 1989/90 | 108.4 | 108.6 | 108.7 | 108.7 | 109.1 | 10 |
| 1990/91 | 110.6 | 111.3 | 111.3 | 111.3 | 111.0 | 11 |
| 1991/92 | 112.2 | 111.1 | | | | |

1/ Average of the months reported to date.

Source: Bureau of Labor Statistics, U.S. Department of Labor.

ybeans, 1979/80-1991/92

| Feb. | Mar. | Apr. | May | June | July | Aug. | Average |
|---|---|---|---|---|---|---|---|
| Carloads | | | | | | | |
| 31,025 | 30,170 | 26,546 | 23,606 | 28,333 | 32,584 | 32,921 | 29,953 |
| 31,108 | 27,657 | 23,490 | 21,291 | 28,014 | 22,162 | 26,152 | 27,506 |
| 27,220 | 26,813 | 25,798 | 23,755 | 22,540 | 27,020 | 25,123 | 25,188 |
| 26,318 | 26,807 | 21,243 | 20,849 | 21,393 | 27,942 | 27,461 | 24,483 |
| 29,105 | 27,666 | 26,784 | 23,616 | 24,335 | 26,632 | 29,848 | 27,970 |
| 23,688 | 23,340 | 20,164 | 17,715 | 24,724 | 22,662 | 20,218 | 23,791 |
| 22,558 | 20,648 | 17,743 | 17,673 | 24,907 | 24,426 | 24,342 | 22,878 |
| 26,663 | 27,134 | 25,046 | 26,189 | 32,154 | 32,257 | 30,825 | 28,249 |
| 34,224 | 34,241 | 32,963 | 30,861 | 33,316 | 29,678 | 27,010 | 31,624 |
| 30,583 | 31,436 | 30,181 | 25,943 | 27,253 | 25,095 | 25,990 | 28,392 |
| 32,605 | 29,648 | 27,938 | 25,696 | 28,122 | 25,717 | 26,904 | 28,615 |
| 28,570 | 28,085 | 24,927 | 20,840 | 24,527 | 25,552 | 27,573 | 25,815 |
| | | | | | | | 1/ 28,795 |

/80-1991/92

| Feb. | Mar. | Apr. | May | June | July | Aug. | Average |
|---|---|---|---|---|---|---|---|
| December 1984=100 | | | | | | | |
| 71.4 | 70.5 | 72.7 | 72.8 | 73.3 | 76.6 | 76.9 | 71.5 |
| 84.1 | 85.0 | 84.8 | 84.8 | 85.7 | 88.0 | 88.5 | 83.3 |
| 93.6 | 93.6 | 93.6 | 93.6 | 93.6 | 93.6 | 93.6 | 92.1 |
| 93.9 | 93.9 | 93.9 | 93.9 | 93.9 | 93.9 | 93.9 | 93.6 |
| 98.0 | 98.0 | 98.0 | 98.0 | 98.0 | 98.4 | 98.4 | 96.8 |
| 100.0 | 99.3 | 99.3 | 98.7 | 97.3 | 96.4 | 96.3 | 98.8 |
| 99.0 | 99.0 | 99.1 | 99.2 | 99.2 | 99.2 | 99.2 | 98.7 |
| 98.3 | 98.8 | 98.6 | 98.5 | 98.6 | 98.6 | 98.5 | 98.5 |
| 101.2 | 101.4 | 102.7 | 104.1 | 104.3 | 106.4 | 109.3 | 102.2 |
| 109.2 | 108.8 | 108.8 | 108.8 | 108.0 | 108.4 | 108.4 | 108.7 |
| 109.1 | 109.1 | 109.7 | 109.7 | 109.2 | 109.7 | 110.5 | 109.1 |
| 111.0 | 112.5 | 112.0 | 111.2 | 109.9 | 112.9 | 112.2 | 111.4 |
| | | | | | | | 1/ 111.7 |

Appendix table 23--Processed feeds: Quantity fed, 1983-91 1/ 2/

| | 1983 | 1984 | 1985 |
|---|---|---|---|
| High protein: | | | |
| Oilseed meal-- | | | |
| Soybean 4/ | 15,980 | 17,672 | 17,318 |
| Cottonseed | 1,022 | 1,595 | 1,379 |
| Linseed | 113 | 109 | 100 |
| Peanut | 68 | 112 | 159 |
| Sunflower | 240 | 307 | 313 |
| Canola | 80 | 139 | 120 |
| Total | 17,503 | 19,934 | 19,389 |
| Animal proteins-- | | | |
| Tankage and meat meal | 2,102 | 2,523 | 2,540 |
| Fishmeal and solubles | 453 | 589 | 464 |
| Milk products | 368 | 386 | 374 |
| Total | 2,923 | 3,498 | 3,377 |
| Grain protein feeds-- | | | |
| Gluten feed and meal | 1,281 | 1,876 | 1,055 |
| Brewers' dried grains | 135 | 142 | 135 |
| Distillers' dried grains | 564 | 807 | 873 |
| Total | 1,980 | 2,825 | 2,063 |
| Other: | | | |
| Wheat millfeeds | 5,078 | 5,084 | 5,278 |
| Rice millfeeds | 461 | 456 | 503 |
| Dried and molasses beetpulp | 536 | 728 | 701 |
| Alfalfa meal | 898 | 808 | 777 |
| Fats and oils | 670 | 672 | 765 |
| Molasses, inedible | 2,070 | 2,407 | 1,887 |
| Miscellaneous byproduct feeds 5/ | 704 | 775 | 870 |
| Total | 10,417 | 10,930 | 10,781 |
| Grand total | 32,823 | 37,187 | 35,610 |

NA = Not available.
1/ Year beginning October. 2/ Adjusted for stocks, productions, foreign tra
4/ Includes use in edible soy products and shipments to U.S. territories. 5/

| 1986 | 1987 | 1988 | 1989 | 1990 | 1991 3/ |
|---|---|---|---|---|---|
| ---- 1,000 metric tons ---- | | | | | |
| 18,495 | 19,317 | 17,833 | 20,464 | 21,026 | 21,115 |
| 1,026 | 1,442 | 1,481 | 1,239 | 1,476 | 1,609 |
| 115 | 127 | 93 | 126 | 115 | 125 |
| 103 | 109 | 147 | 112 | 99 | 135 |
| 269 | 381 | 306 | 269 | 287 | 415 |
| 204 | 219 | 322 | 316 | 361 | 375 |
| 20,212 | 21,595 | 20,182 | 22,526 | 23,364 | 23,774 |
| 2,395 | 2,457 | 2,328 | 2,320 | 2,250 | 2,350 |
| 471 | 353 | 265 | 321 | 260 | 265 |
| 398 | 412 | 407 | 400 | 390 | 380 |
| 3,265 | 3,221 | 3,001 | 3,041 | 2,900 | 2,995 |
| 1,165 | 1,484 | 1,289 | 218 | 164 | 200 |
| 146 | 120 | 114 | 125 | NA | NA |
| 805 | 1,035 | 830 | 850 | NA | NA |
| 2,116 | 2,639 | 2,233 | 1,193 | NA | NA |
| 5,714 | 5,652 | 5,717 | 5,716 | 5,965 | 5,995 |
| 610 | 551 | 615 | 556 | 555 | 555 |
| 645 | 699 | 661 | 758 | 1,051 | 925 |
| 589 | 554 | 365 | 300 | 351 | 400 |
| 832 | 826 | 944 | 972 | 1,010 | 1,050 |
| 1,771 | 1,598 | 1,593 | 1,988 | 2,160 | 2,100 |
| 978 | 1,034 | 1,186 | 1,342 | 1,562 | 1,403 |
| 11,139 | 10,914 | 11,081 | 11,632 | 12,654 | 12,428 |
| 36,732 | 38,369 | 36,497 | 38,392 | NA | NA |

n trade, and nonfeed uses where applicable. 3/ Forecast.
5/ Allowance for hominy feed, oat millfeeds, and screenings.

Appendix table 24--Feed Concentrates, number of animal units, and feed per

| | 1983 | 1984 | 1985 |
|---|---|---|---|
| Concentrates: | | | |
| Corn | 97.3 | 103.9 | 105.5 |
| Sorghum | 9.8 | 13.7 | 16.9 |
| Oats | 6.7 | 6.5 | 6.4 |
| Barley | 6.1 | 6.4 | 7.2 |
| Wheat and rye | 12.7 | 10.2 | 11.2 |
| Oilseed meals | 17.5 | 19.9 | 19.4 |
| Animal protein feeds | 2.9 | 3.5 | 3.4 |
| Grain protein feeds | 2.0 | 2.8 | 2.1 |
| Other byproduct feeds | 10.4 | 10.9 | 10.8 |
| Total | 165.4 | 177.9 | 375.5 |
| Grain-consuming animal units (GCAU's): | | | |
| Dairy cattle | 12.4 | 12.1 | 12.5 |
| Cattle on feed | 17.8 | 19.1 | 18.0 |
| Other cattle | 4.7 | 4.5 | 4.3 |
| Hogs | 20.4 | 19.8 | 19.3 |
| Poultry | 18.6 | 19.0 | 19.8 |
| Other livestock | 0.7 | 0.7 | 0.7 |
| Total | 74.6 | 75.2 | 74.5 |
| Concentrates GCAU | | | |
| Four feed grains | 1.61 | 1.74 | 1.83 |
| All concentrates | 2.22 | 2.37 | 5.04 |

1/ Marketing years, 1990/91 forecast.

ed per unit, 1983-1991 1/

| 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|
| | Million metric tons | | | | | |
| 105.5 | 119.4 | 122.2 | 101.1 | 113.2 | 119.6 | 121.9 |
| 16.9 | 13.6 | 14.1 | 11.9 | 13.1 | 10.2 | 9.9 |
| 6.4 | 5.5 | 4.5 | 3.3 | 3.8 | 4.3 | 3.6 |
| 7.2 | 6.1 | 5.9 | 4.1 | 4.1 | 4.0 | 3.8 |
| 11.2 | 11.4 | 5.7 | 3.8 | 4.0 | 13.5 | 9.7 |
| 19.4 | 20.2 | 21.6 | 20.2 | 22.5 | 23.4 | 23.8 |
| 3.4 | 3.3 | 3.2 | 3.0 | 3.0 | 2.9 | 3.0 |
| 2.1 | 2.1 | 2.6 | 2.2 | 1.2 | NA | NA |
| 10.8 | 11.1 | 10.9 | 11.1 | 11.6 | 12.7 | 12.4 |
| 375.5 | 192.7 | 190.7 | 160.7 | 176.5 | NA | NA |
| | Million units | | | | | |
| 12.5 | 11.7 | 11.5 | 11.4 | 11.4 | 11.4 | 11.1 |
| 18.0 | 17.3 | 18.2 | 17.5 | 17.8 | 19.5 | 18.1 |
| 4.3 | 4.2 | 4.0 | 4.0 | 4.0 | 4.0 | 4.2 |
| 19.3 | 19.4 | 20.8 | 21.3 | 20.7 | 21.0 | 22.4 |
| 19.8 | 21.1 | 21.5 | 22.0 | 23.1 | 24.1 | 24.9 |
| 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.7 | 0.7 |
| 74.5 | 74.4 | 76.7 | 77.0 | 77.6 | 80.7 | 81.5 |
| | Tons per unit | | | | | |
| 1.83 | 1.94 | 1.91 | 1.56 | 1.73 | 1.71 | 1.71 |
| 5.04 | 2.59 | 2.49 | 2.09 | 2.27 | NA | NA |

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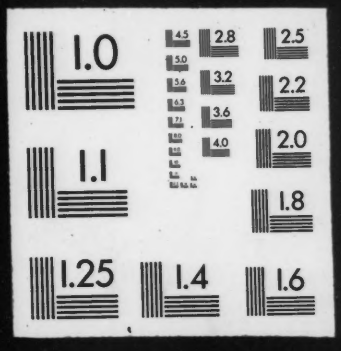
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